



Annual Review

2022 • 2023

(Covering 2021-2022)

FACULTY OF TROPICAL MEDICINE
MAHIDOL UNIVERSITY

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DEAN'S FOREWORD



The years 2021 and 2022 saw the negative effects of the COVID-19 pandemic in our society, but also created new opportunities and turned lessons-learned to our advantage. Over the past two years, the Faculty of Tropical Medicine, Mahidol University has overcome critical challenges and made numerous achievements in research, health services, education, sustainable development, and international collaborations.

Our research publication rates reached new highs in 2021 and 2022, with 460 and 465 papers, respectively. Eighty percent of those papers have been published in Q1 journals. Our funding sources also grew, securing new grants and projects from domestic and international funding agencies.

We are involved in the largest trials of drugs and vaccines for dengue, malaria, acellular pertussis, and COVID-19. Recently, we received funding from The Global Health Innovative Technology (GHIT) for the development of a novel Pvs25 nucleoside-modified mRNA vaccine for *Plasmodium vivax* malaria. We are a key part of PLATCOV, a platform trial that assesses the effects of treatments for COVID-19. Moreover, our Faculty developed products such as COVID-19 diagnostic test kits, melioidosis antibody test, and therapeutic human antibody against dengue virus, to name a few.

We are consistently going beyond basic science to translational products with enhanced social impact and benefit to the community.

The Faculty's expertise and knowledge are shared with young researchers and practitioners around the world. We organized a series of international training courses for the management of malaria via a virtual platform. In 2022, we hosted the first-ever hybrid mode for the Joint International Tropical Medicine Meeting, which provided an inclusive knowledge-sharing and networking platform for those who were unable to travel internationally.

Our health services continue to improve and transform. In 2021 and 2022, the Hospital for Tropical Diseases made notable achievements. We successfully maintained the services of the Hospital during the COVID-19 pandemic. We did not suspend any OPD, IPD, fever, travel clinic services for even a single day. We successfully transformed our services to help people with COVID-19 by operating a new ARI clinic, new swab units, and a new cohort ward for COVID-19 in-patients. We also collaborated with Phyathai District Office to settle the Community Isolation Unit. Later in the pandemic, we developed a Home Isolation system to take care of patients with COVID-19. Our hospital also played a significant role in providing COVID-19 vaccinations to members of the public.

During the last two years, the Hospital has successfully moved technologically towards being a “Smart Hospital”. We have a new website equipped with an online registration and booking system. We also have a mobile app, QR code payment, smart IOT (healthcare Internet of Things) devices, smart TV, and many other hospital innovations. The Hospital was also recognized with the 3rd Hospital reAccreditation (HA) award, and gold level awards for the Bangkok Green and Clean Plus program, from the Bangkok Metropolitan Authority (BMA).

Throughout the pandemic, the Bangkok School of Tropical Medicine (BSTM) continued to provide support and quality educations for its students. The BSTM channeled internal and external scholarships for Thai and international students. The School also supported students and staff to study or teach abroad through the outbound program and Mahidol University Global Connectivity Project.

The BSTM strengthened its online learning platform by creating more online courses. The need for online teaching instruction inspired students and teaching staff to become rapidly more competent with online tools, educational technologies, and other 21st-Century skills.

The Faculty actively contributes to the achievement of the Sustainable Development Goals (SDGs) through our missions--teaching, research, community engagement, academic and non-academic services, hospital management, and overall faculty management practices. We contribute to the SDG targets according to our mission, roles and context. The three dominant targets are SDG3 (Good Health and Well-being), SDG4 (Quality Education), and SDG17 (Partnerships for the Goals).

For SDG 3, aside from treating tropical infectious diseases, and other common diseases, travel medicine has also been a specialization. We provide vaccination, treatment, and consultation services for tourists and travelers in Thailand. For SDG4, we offer degrees and courses with international programs and support scholarships of students from LMICs. Lastly, for SDG17, we have many collaborations for teaching, research and academic services at both national and international scales. Partnership is one of the keys to achieving all of the targets of the SDGs.

We aim to strengthen our international collaborations further. To highlight a few milestones, we currently have 63 active Memoranda of Understanding (MOU) and Memoranda of Agreement (MOA) with 63 collaborative partners from all over the world. In 2021, we collaborated with the Wellcome Trust, the University of Oxford, the National University of Singapore, Nanyang Technological University, Tan Tock Seng Hospital, and the Christian Medical College (CMC) in Vellore, India, to establish the Network for Clinical Research in Asia (Clinical Trials Network).

Our relationship with longstanding alliances and partners, such as MORU, SEAMEO TROPMED, the Malaria Consortium, Silom Community, and WWARN remain strong and productive.

I am proud of the achievements of the Faculty during the past two years. We brought our vision into fruition despite the external factors and challenges that stood in our paths. I strongly encourage everyone to have an optimistic perspective and to focus strongly on achieving their aspirations.

Finally, I would like to commend our resilient and highly motivated staff for continuously working on realizing their goals. Thank you very much for your efforts and contributions, which are the foundation of our Faculty and its achievements. It is always a pleasure to work with you.

Towards a thriving and healthy future,



Assoc. Prof. Weerapong Phumratanapapin, MD

Dean

Faculty of Tropical Medicine, Mahidol University

STRATEGIC PLAN 2023-2027

• Faculty of Tropical Medicine, Mahidol University

VISION / 'To be a World Leader in Tropical Medicine'

MISSION / 'To Strive for Excellence in Research, Education and Health Services in Tropical Medicine'

// STRATEGIC PLAN 1

Research with global and social impact

// STRATEGIC PLAN 2

Outcome-based education for globally-competent professionals

// STRATEGIC PLAN 3

Leader in Tropical Health and Academic Services

// STRATEGIC PLAN 3

Sustainable Quality Organization



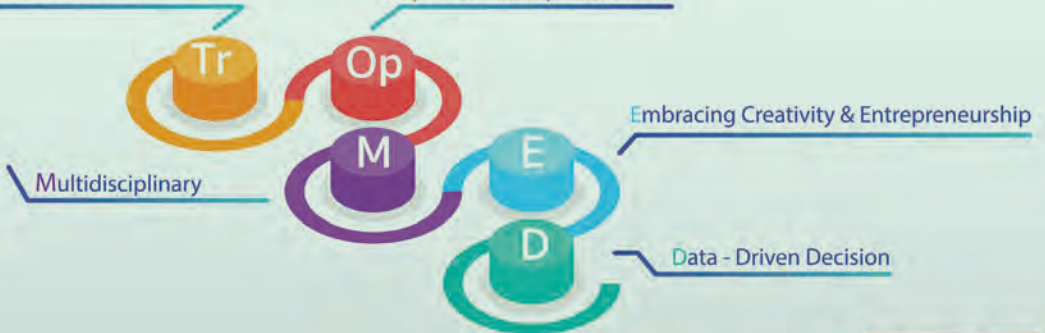


TropMed CORE VALUES



Transformation & Innovation

Open & Globally Connected



Scan QR Code



ADMINISTRATIVE BOARD

Faculty Committee



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Term: 2019-2022



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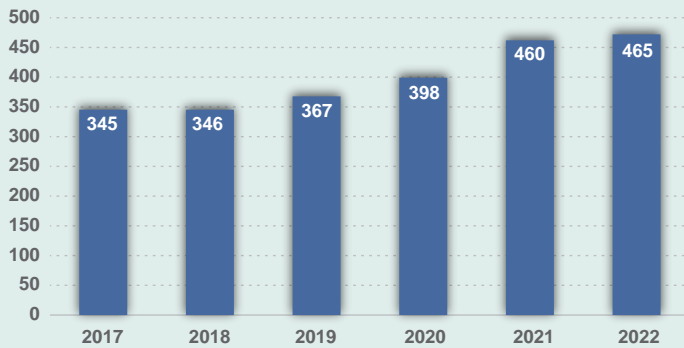
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STATISTICAL SUMMARY 2021-2022



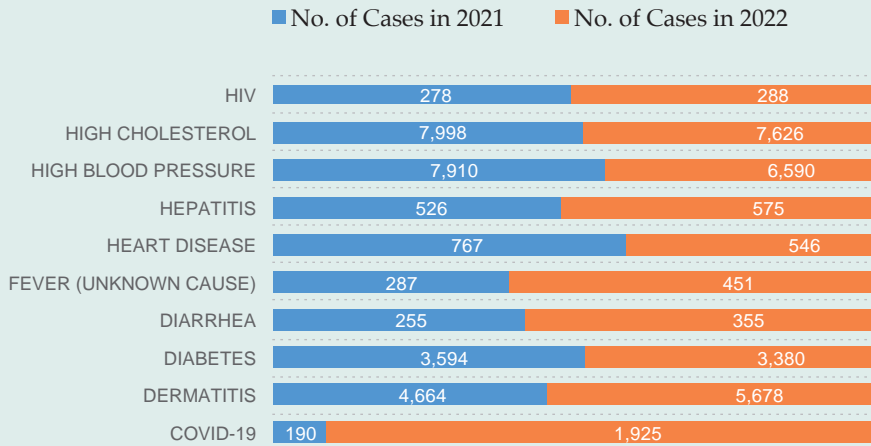
RESEARCH

PUBLICATIONS



HOSPITAL FOR TROPICAL DISEASES

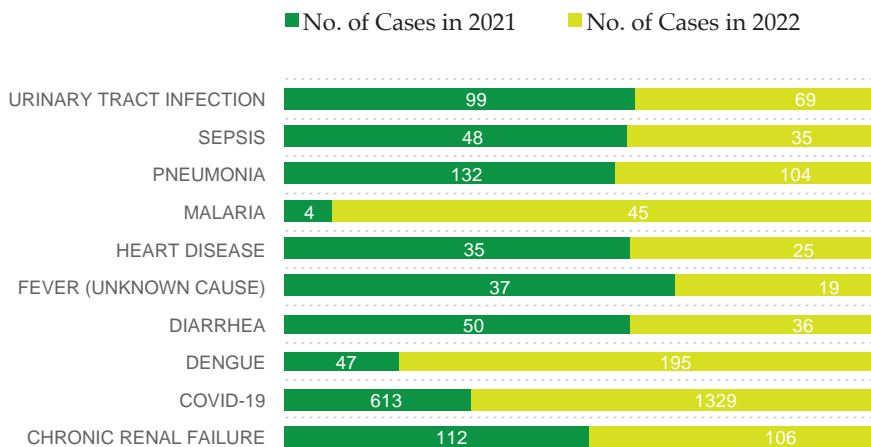
OUTPATIENT CASES



26,469
Outpatient cases
in 2021

27,414
Outpatient case
in 2022

INPATIENT CASES

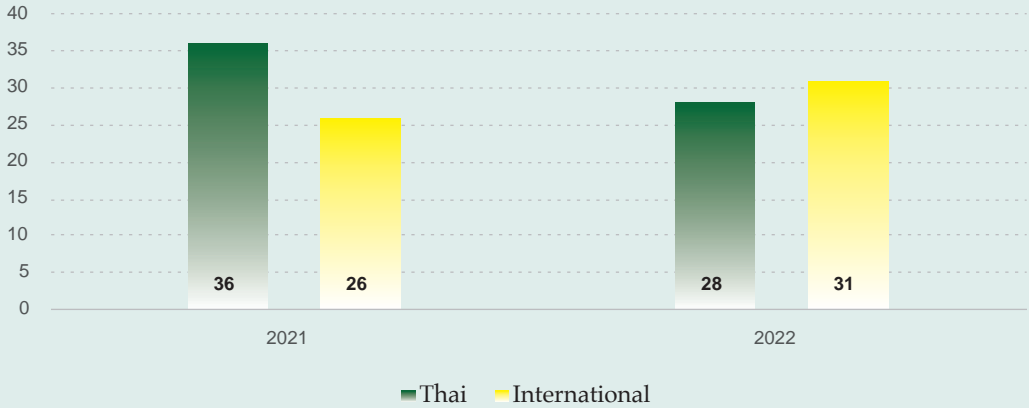


1,177
Inpatient cases
in 2021

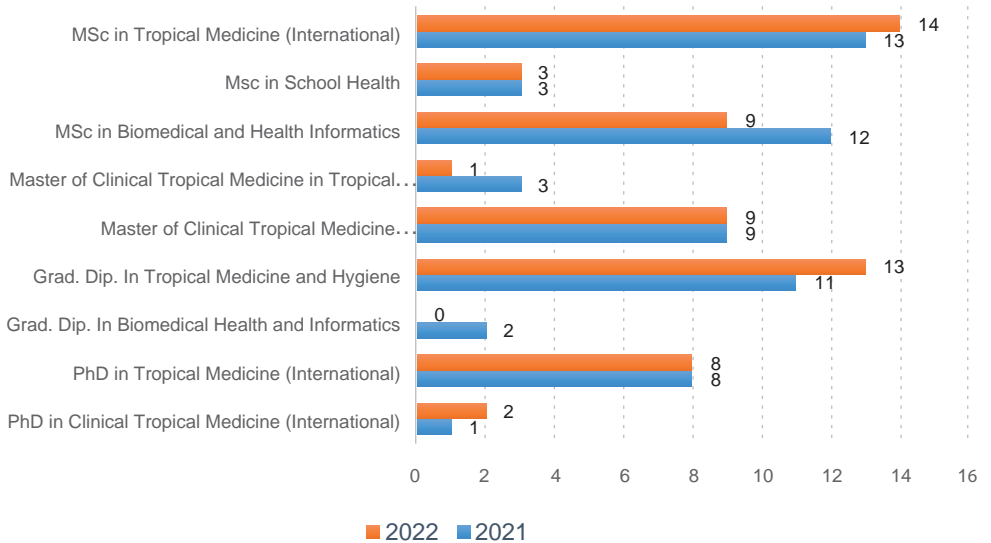
1,963
Inpatient cases
in 2022

BANGKOK SCHOOL OF TROPICAL MEDICINE

NUMBER OF STUDENTS

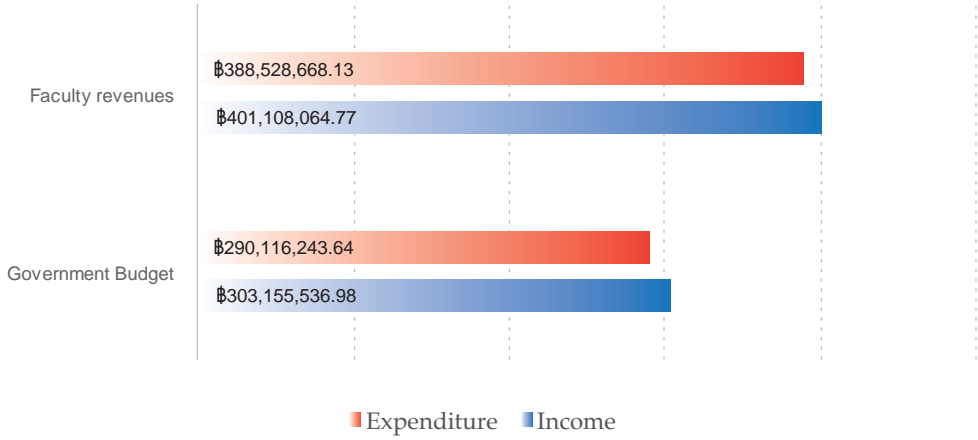


COURSES ENROLLED

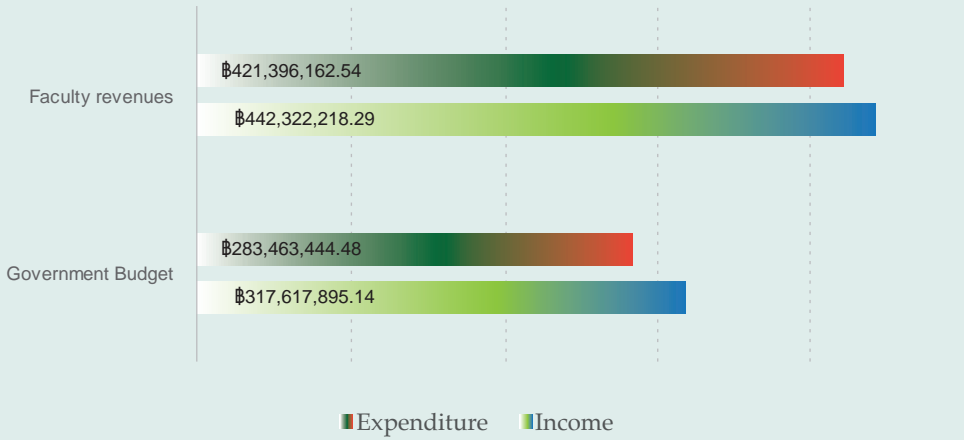


FINANCES

2021



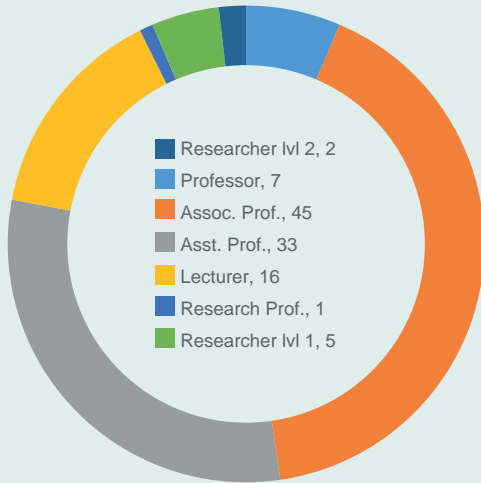
2022



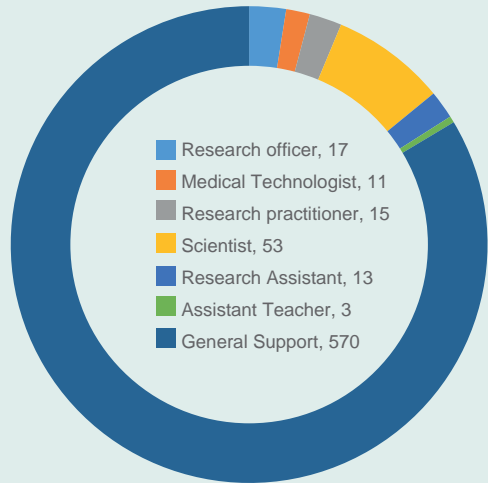
HUMAN RESOURCES

(1 December 2021)

Academic Staff: 109

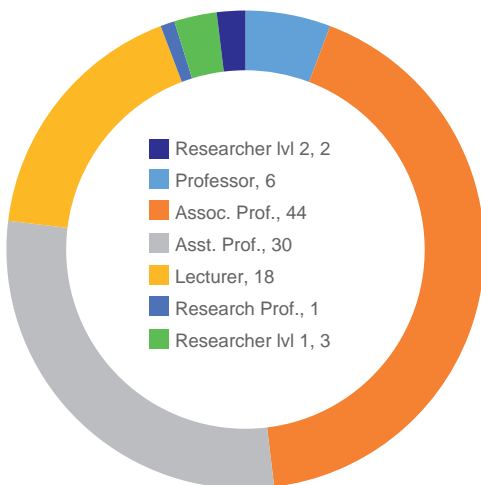


Support Staff: 682

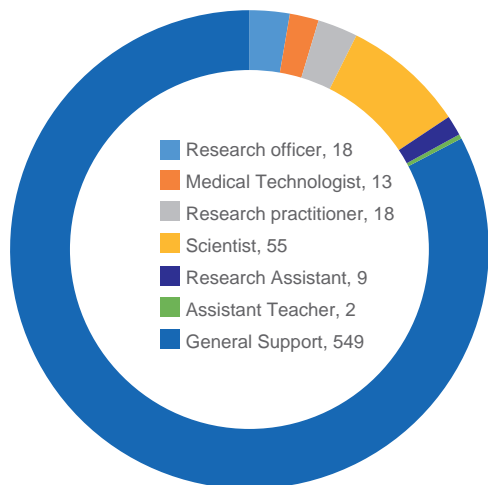


(1 December 2022)

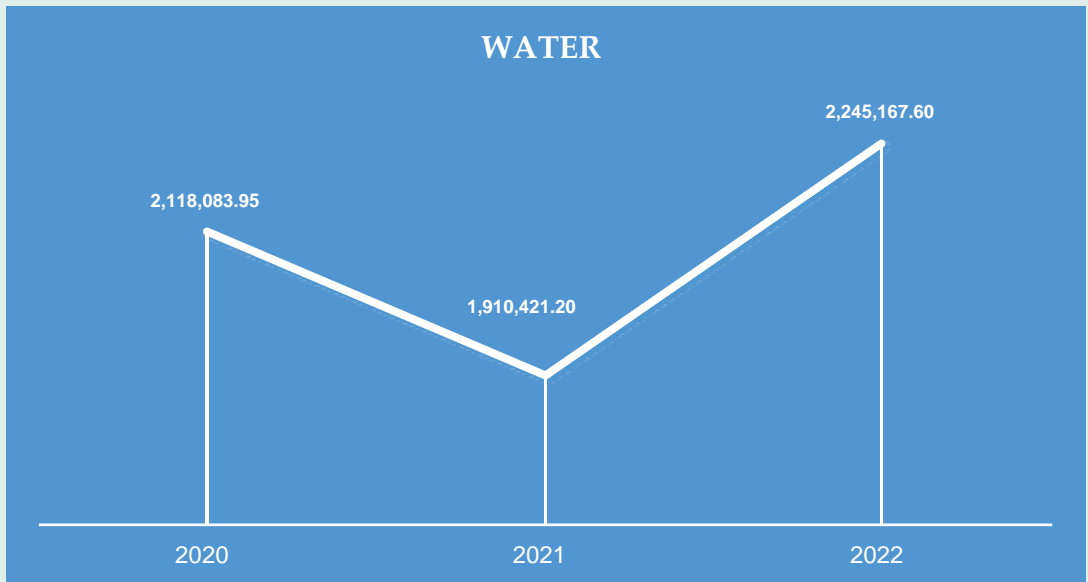
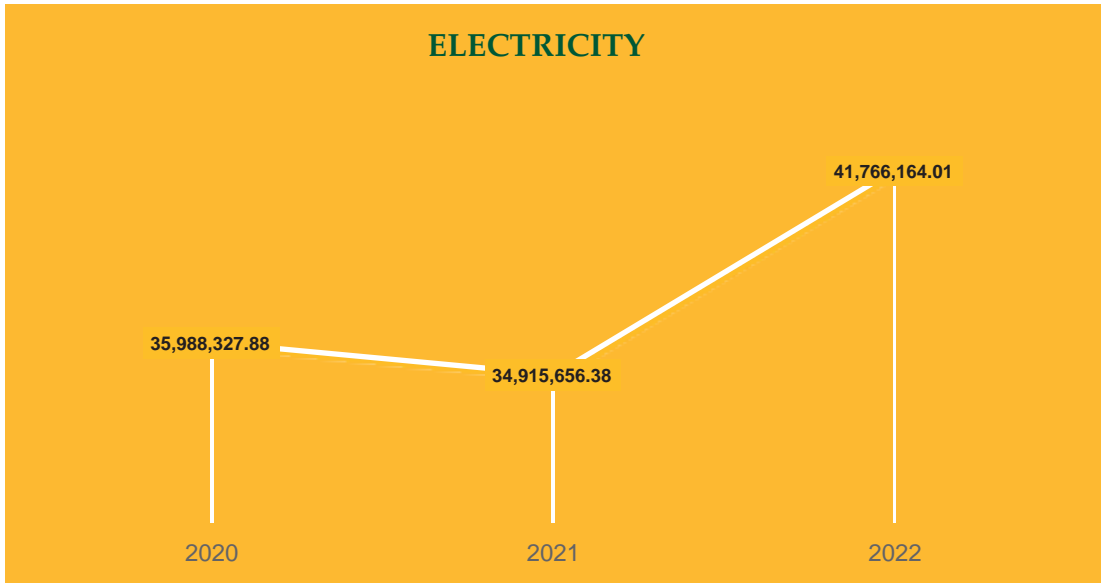
Academic Staff-104



Support Staff-664



INFRASTRUCTURE AND ENERGY USE



ORGANISATIONAL CHART



Mahidol University
Faculty of Tropical Medicine

DEAN
(Assoc.Prof. Weerapong Phumratanaprapin)

FACULTY COMMITTEE

11 Departments

Hospital
(Assoc.Prof. Watcharapong Piyaphanee)

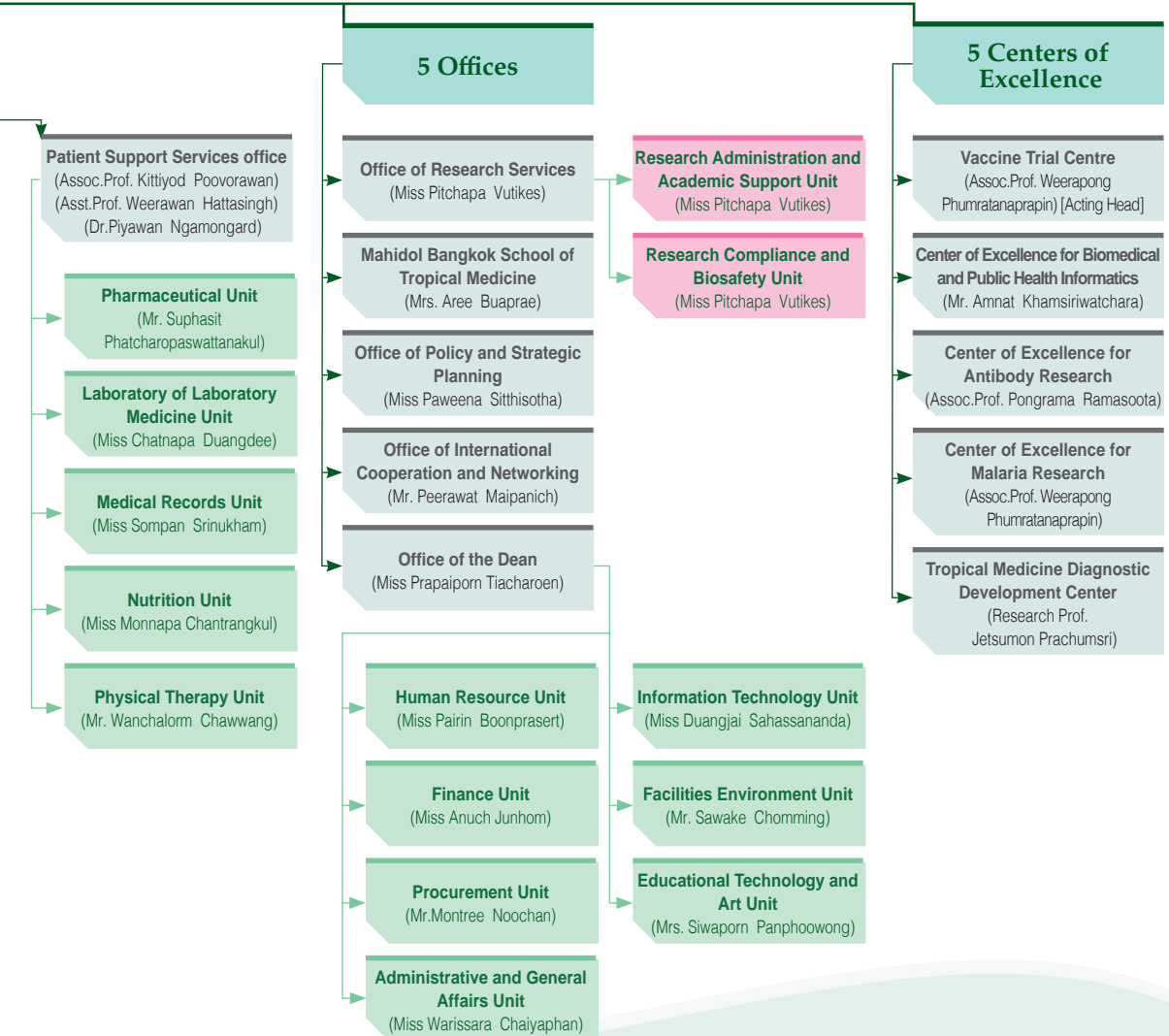
- ▶ **Department of Clinical Tropical Medicine**
(Asst.Prof. Udomsak Silacharnroon)
- ▶ **Department of Helminthology**
(Assoc. Prof. Dorn Watthanakulpanich)
- ▶ **Department of Medical Entomology**
(Assoc.Prof. Patchara Sriwichai)
- ▶ **Department of Microbiology and Immunology**
(Assoc.Prof.Pomsawan Leangwutiwong)
- ▶ **Department of Molecular Tropical Medicine and Genetics**
(Prof. Mallika Imwong)
- ▶ **Department of Protozoology**
(Assoc.Prof. Aongart Mahittikorn)
- ▶ **Department of Social and Environmental Medicine**
(Assoc.Prof. Pongrama Ramasoota)
- ▶ **Department of Tropical Hygiene**
(Assoc.Prof. Saranath Lawpoolsri)
- ▶ **Department of Tropical Nutrition and Food Science**
(Assoc.Prof. Pattaneeya Prangthip)
- ▶ **Department of Tropical Pathology**
(Prof. Parnpen Viriyavejakul)
- ▶ **Department of Tropical Paediatrics**
(Assoc.Prof. Kriengsak Limkittikul)

- ▶ **Administration Office**
(Asst.Prof. Sant Muangnoicharoen)
- ▶ **Administration Unit**
(Miss Pakamas Jaichob)
- ▶ **Finance and Social Welfare Unit**
(Mrs. Jitra Suriya)

- ▶ **Nursing Administration Office**
(Mrs. Kongkeaw Younboonhlum)
- ▶ **OPD Service Unit**
(Mrs. Pittaya Piroonamornpun)
- ▶ **IPD Service Unit**
(Miss Thanee Raknam)
- ▶ **ICU Service Unit**
(Miss Rattanaporn Saelim)
- ▶ **Teaching and Academic Unit**
(Mrs. Budsya Liaphawee)

- ▶ **Medical and Academic Office**
(Asst.Prof. Chayasin Mansanguan)
- ▶ **Haemodialysis Unit**
(Assoc. Prof. Weerapong Phumratanaprapin)
- ▶ **Clinical Trials Unit**
(Assoc. Prof. Kittiyod Poovorawan)
- ▶ **Radiological Imaging Unit**
(Miss Waraporn Suttithum)
- ▶ **Travel Medicine Unit**
(Asst. Prof. Wasin Matsee)

FACULTY SENATE
 (Prof. Narisara Chantratita)



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CENTERS OF EXCELLENCE

Heads of Centers



Mr. Amnat Khamsiriwathara
Chief Executive Officer (CEO), Center
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Health Informatics (BIOPHICS)



Assoc. Prof. Pongrama Ramasoota
Center of Excellence for Antibody
Research (CEAR)



Asst. Prof. Thanat Chookajorn
Genomics and Evolutionary Medicine
Unit (GEM)

Term: 2014-2022



Prof. Punnee Pitisuttithum
Former Head, Vaccine Trial Centre (VTC)

Term: 2017-2021



Assoc. Prof. Weerapong Phumratanaarpin
Acting Head, Vaccine Trial Centre (VTC)

Term: 2022-Present



Research. Prof. Jetsumon Prachumsri
Mahidol Vivax Research Unit (MVRU)



Prof. Sivicha Krudsood
Clinical Malaria Research Unit (CMRU)



Dr. Rapatbhorn Patrapuwich
Drug Research Unit for Malaria (DRUM)



RESEARCH



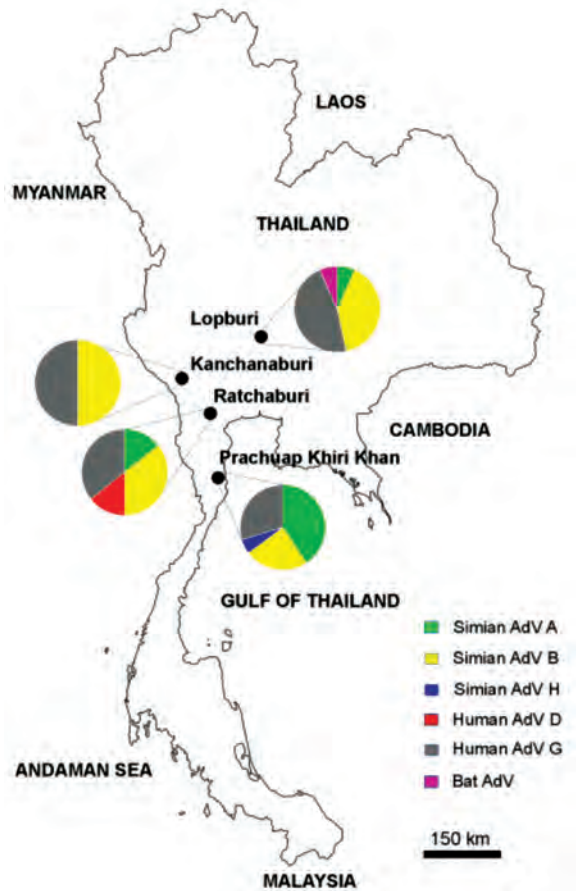
COVID-19

- The research paper by Asst. Prof. Chayasin Mansanguan et al, “Cardiovascular Manifestation of the BNT162b2 mRNA COVID-19 Vaccine in Adolescents” was in the top 5% Altmetric Attention Scores (2,649 at time of writing). It has been mentioned by 18 news outlets and shared to various social media platform 3,499 times. The paper has been cited by 34 other publications.
- The results of the phase 1 / 2 clinical trial of GPO NDV-HXP-S, an inactivated egg-based Newcastle disease virus vaccine expressing the spike protein of SARS-CoV-2, by Prof. Emer. Punnee Pitisuttithum showed that the most common solicited adverse events were mild, such as site pain, fatigue, headache, and myalgia. There were no vaccine-related serious adverse events. The inactivated NDV-HXP-S vaccine candidate has an acceptable safety profile and is highly immunogenic. This vaccine can be produced at low cost in any facility designed for the production of inactivated influenza virus vaccine; such facilities are present in a number of LMICs.
- Dr. Sarunporn Tandhavanant conducted a longitudinal analysis to characterize classes and subclasses of antibody responses to recombinant receptor-binding protein (RBD) of SARS-CoV-2 in COVID-19 patients in Thailand. She found that IgA, total IgG, IgG1 and IgG3 are the major antibody responses against RBD of the spike of SARS-CoV-2 in COVID-19 patients. The results suggest that the RBD-specific antibody detection is a potential assay for the examination of the immune response in SARS-CoV-2 infection and vaccination.
- With funding support from The Rockefeller Foundation to help COVID-19 surveillance teams in Southeast Asia, the Genomics Evolutionary Medicine Unit (GEM) and partners can now produce several high-quality genomes.
- Prof. Kesinee Chotivanich is evaluating the level of cell-derived microparticle as a biological marker in COVID-19.



VIRAL DISEASES

- Asst. Prof. Chayasin Mansanguan is investigating the incidence and clinical characteristics of Respiratory Syncytial Virus (RSV) infection in influenza-like illness among adults in Thailand.
- Enterovirus (EV) A71 was the most common enterovirus detected in a prospective cohort study of children attending five kindergartens in Thailand, and most of the infected persons developed symptoms, a molecular epidemiological study and mathematical modelling of hand, foot, and mouth disease (HFMD) by Asst. Prof. Supawat Chatchen revealed. Other enteroviruses included coxsackieviruses (CVs) A4, CV-A6, CV-A9, and CV-A10, as well as echovirus. The pattern of the spread of HFMD showed that 45% of the subsequent enteroviruses detected in each outbreak possessed the same serotype as the first index case.
- A surveillance study of acute flaccid paralysis (AFP) by researchers at the Department of Microbiology and Immunology reported non-polio enteroviruses (NPEVs) for the first time in Thailand. AFP surveillance has unearthed many unknown NPEVs and the causes of death due to AFP that occur annually. The study highlights the importance of investigating NPEVs in the wake of the eradication of poliovirus in the context of the continued incidence of paralysis. The study was conducted as part of the World Health Organization's strategy for completely eradicating poliomyelitis and leaving NPEVs as one of the main potential causes of AFP.
- A paper by Assoc. Prof. Nathamon Kosoltanapiwat, entitled "Simian adenoviruses: molecular and serological survey in monkeys and humans in Thailand" described a molecular- and sero-surveillance of adenoviruses in monkeys and humans living in proximity to study the viral zoonotic potential. Some of the detected adenoviruses



have been reported to cause cross-species infection. Therefore, the research suggests that virus surveillance in monkeys and humans using the One Health approach is important as part of emerging zoonotic-disease control.



MALARIA

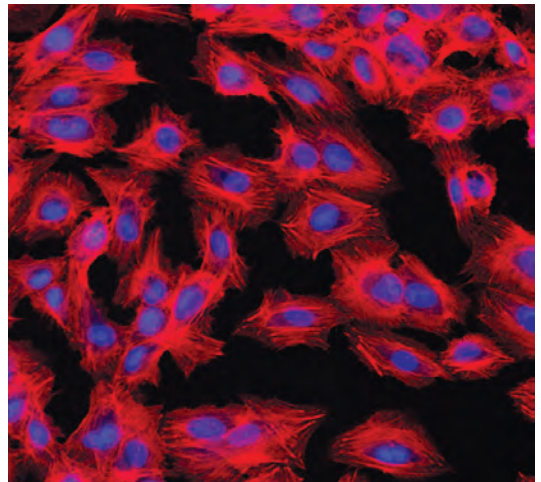
- The Malaria Infection Study in Thailand (MIST) is a collaborative effort between the Mahidol Oxford Tropical Medicine Research Unit (MORU) and funded by the Wellcome Trust. Led by Research Prof. Jetsumon Prachumsri and Dr. Wanlapa Roobsoong, this study aims to assess the effectiveness of vaccines or novel anti-malarial compounds by deliberately exposing volunteers to *P. vivax* infection. Building upon the success of MIST1, which

focused on the secure production and testing of *P. vivax* infected-blood in 2020, the subsequent phase (MIST2) in 2022 involved administering a blood-stage inoculum to the 16 volunteers for initial assessment. Encouragingly, the outcomes thus far indicate a promising absence of vivax malaria relapses without any detrimental consequences or side effects.

- The Southeast Asia International Centers of Excellence for Malaria Research (SEA-ICEMR), funded by the US NIH, spearheaded by Research Prof. Jetsumon Prachumsri and Dr. Wanlapa Roobsoong in conjunction with Assoc. Prof. Saranath Lawpoolsri of Department of Tropical Hygiene, is dedicated to three crucial domains. First, it leverages surveillance methods to gain valuable insights into transmission patterns. Second, it delves into the characteristics and behaviors of diverse mosquito vectors. Third, it investigates the emergence and spread of antimalarial drug resistance. Through meticulous research, this project has generated a series of publications with the potential to make a profound scientific impact. These publications will serve as a catalyst for formulating actionable strategies and policies for the National Malaria Program. Furthermore, the project aims to establish a prestigious online platform for routine malaria surveillance, thereby enhancing the effectiveness and reach of existing program.
- Prof. Kesinee Chotivanich conducted numerous studies on *P. falciparum* and *P. vivax*, primarily on the development, evaluation, and susceptibility testing of antimalarial drugs and treatments, such as ivermectin, artemisinin, methylene blue, and triple therapy. She also investigated the biology and pathophysiology of *P. knowlesi*, studied its adhesion characteristics and fitness in infected red cells, and monitored its susceptibility to antimalarial drugs.
- Assoc. Prof. Wang Nguitragool's laboratory, in collaboration with the Mahidol Vivax Research Unit (MVRU), demonstrated a role of a human

protein in the development of *P. vivax* in hepatocytes. Based on this discovery, his team has created novel cell lines that provide better support for the *in-vitro* growth of liver-stage *P. vivax* parasites. As a result, drug and vaccine screening for this parasite is expected to become significantly more efficient.

- Prof. Parnpen Viriyavejakul's work focused on the pathogenesis of severe malaria and post-signaling events following malaria infection. Recently, her group detected cytoskeleton damage in endothelial cells induced with malaria sera and has proven *in vitro* that the decline in cytoskeleton proteins (F-actin, F:G ratio and vimentin) could be potential biomarkers in severe *P. falciparum* malaria. This also leads to further research on testing for potential adjuvant drugs to restore endothelial cell cytoskeleton.



Immunofluorescence image of F-actin in endothelial cells. Actin cytoskeleton appears as red filaments and nuclei stained blue with DAPI.

- A highly-cited publication by Assoc. Prof. Aongart Mahittikorn, entitled "Comparison of *Plasmodium ovale curtisi* and *Plasmodium ovale wallikeri* infections by a meta-analysis approach", discovered that malaria caused

by *P. ovale curtisi* in higher proportions among imported cases and had longer latency periods, higher platelet counts, and higher total leukocyte counts than malaria caused by *P. ovale wallikeri*. This meta-analysis was published in *Scientific Reports* in 2021 and is currently cited by 19 publications.

- Assoc. Prof. Patchara Sriwichai revealed that the population genetic structure of *An. minimus* has high adaptability for the species to be a malaria vector. This research presents the current malaria-vector situation with stronger adaptability to the genetic level. There was substantial gene flow between the eastern and western *An. minimus* populations without detection of significant gene-flow barriers.
- Assoc. Prof. Usa Boonyuen and colleagues developed a multiplexed high-resolution melting (HRM) assay, a rapid molecular diagnostic test for G6PD deficiency. The sensitivity of the HRM assay for detecting G6PD mutations was 100% with 100% specificity. The multiplexed HRM-based assay is sensitive and reliable for detecting G6PD mutations. This genotyping assay can facilitate the detection of heterozygotes, which could be useful as a supplementary approach for high-throughput screening of G6PD deficiency in malaria-endemic areas before the administration of primaquine and tafenoquine.
- A systematic review and meta-analysis by Assoc. Prof. Aongart Mahittikorn, published in the high-impact *Journal of Travel Medicine* (39.19 IF, 2021), confirmed increased tumor necrosis factor-alpha (TNF- α) levels in patients with severe malaria. The study suggests that TNF- α may be alternatively used as a prognostic biomarker for severe malaria.

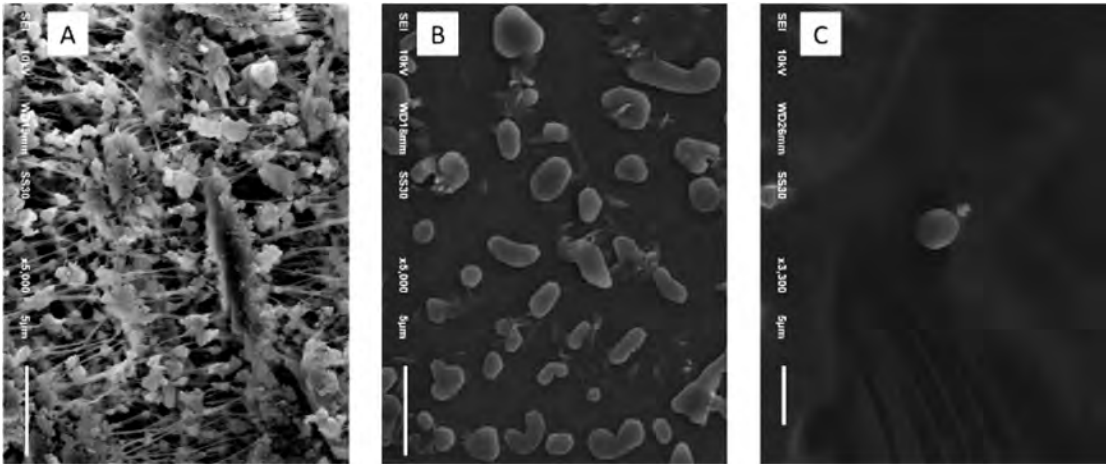
Sirivichayakul, determined that Takada dengue vaccine is safe and efficacious against symptomatic dengue over 3 years. The clinical trial produced two papers published in *Clinical Infectious Diseases* and *The Journal of Infectious Diseases*.

- Assoc. Prof. Pornthep Chanthavanich concluded the phase 2 trials of inactivated vero cell-derived Japanese Encephalitis vaccine in Thai Children (JE0153). The results confirmed that JE vaccine is safe and immunogenic. The seroprotection rates at 1 year was 100%, gradually decreasing to 93% at 5 years post-booster. A 2-dose primary immunization and booster 1 year later with CVI-JE provided long-lasting immunity in the majority of children.
- Enhanced proteobacteria, along with leaky gut syndrome, might be related to impaired microbial control in critical dengue infections and cause more severe disease, a study by researchers at the Department of Clinical Tropical Medicine has revealed.
- Assoc. Prof. Suchada Sumruayphol uses geometric morphometric techniques for medical insect species identification into species complex, diversity, and resistant gene relationships. She is currently co-leader, expanding this knowhow through networks of national and international universities, and other organizations. The Faculty has a MOU with the National Museum of Thailand and provides a geometric morphometric application for species confirmation and network training.
- Asst. Prof. Thipruethai Phanitchat published a paper on the impact of air pollution, pm2.5, on the feeding pattern and productivity of the dengue mosquito vector, *Aedes aegypti*. She developed a pm2.5 generator for her research and investigated the mosquito's biology. It was found that the pm 2.5 particle impacts upon mosquito blood feeding behavior and the pattern of ovarian alteration.



DENGUE AND OTHER VECTOR-BORNE DISEASES

- The phase 3 trial of Takeda dengue vaccine, conducted by Assoc. Prof. Chukiat



A-C shows pm2.5 particle attach to mosquito body

- A research study on the burden of dengue infection in children and adults in Bangphae District, Ratchaburi Province, Thailand was conducted by Assoc. Prof. Pornthep Chanthavanich and colleagues. They discovered that the overall seroprevalence determined by dengue IgG ELISA was 74.3% in 2012, increasing to 79.4% in 2015. Over 98% of subjects aged > 25 years were found to be seropositive. Among 518 seronegative subjects at enrollment, the seroconversion rate ranged between 4.8% (between M16 and M24) and 14.7% (between M0 and M8). The dominant serotype of primary DENV infection was DENV-2.
- Assoc. Prof. Kriengsak Limkittikul led an epidemiological study of fever with rash (zika) in Amphawa District, Samut Songkhram Province, Thailand. Their findings, published in *Viruses*, showed that the zika seroconversion rate in that community was 7/100 person-years. The ratio of asymptomatic to symptomatic zika infections was 4.5:1. The cases in their study confirmed the occurrence of occult ZIKV infections, which might promote the spread of ZIKV among vulnerable groups of the community.
- The incidence of zika virus infection in Bangphae District, Ratchaburi Province during 2011-2015 was investigated by Asst. Prof. Supawat Chatchen. Through ELISA, he found that the seroprevalences of DENV, ZIKV, and CHIKV in Bangphae District, Ratchaburi Province were 84.3%, 58.0%, and 22.5%, respectively. 16% of the study population was seropositive for all three viruses. The DPP® IgG is less sensitive than ELISA. This rapid test may not be sensitive enough for use in seroprevalence studies.
- Assoc. Prof. Pornsawan Leungwutiwong and colleagues studied the genetic diversity of dengue virus (DENV) in clinical specimens from Bangkok, Thailand, during 2018–2020. They found that all four serotypes of DENV with multiple genotypes and/or clades co-circulate in Bangkok. Continuous investigation of DENV is warranted to further determine the relationship between DENV within Thailand and neighboring countries in Southeast Asia and Asia.

 HIV/AIDS

- Asst. Prof. Sant Muangnoicharoen, Prof. Emer. Punnee Pitisuttithum, and colleagues measured human immunodeficiency virus (HIV) incidence, retention, and assessed risk factors for seroconversion among two previously unreported cohorts of men who have sex with men (MSM) and Transgender Women (TGW) in Bangkok, Thailand between 2017 and 2019 (1,017 participants). The study showed that the incidence of HIV remains high among Bangkok-based MSM and TGW (95%). However, these key populations expressed high interest in participating in evaluating the efficacy of future prevention strategies and the retention rate was high in this 18-month study (95%).

 PARASITIC DISEASES

- *Angiostrongylus malaysiensis*, which is closely related to *Angiostrongylus cantonensis*, has been proven to infect humans, as PCR and DNA sequencing approaches showed *A. malaysiensis* and *A. cantonensis*. Assoc. Prof. Dorn Watthanakulpanich and colleagues put forward the first evidence of *A. malaysiensis* detected in humans and supports the potential of coinfection among *A. cantonensis* and *A. malaysiensis*. The study, published in *Food Waterborne Parasitology*, proves that *A. malaysiensis* itself could be a zoonotic pathogen.
- Tapanee Kanjanapruthipong and Assoc. Prof. Dorn Watthanakulpanich described in detail for the first time the morphology and survival of drug-treated immature stage (STIM) of *Gnathostoma spinigerum* recovered from infected patients; the study focused on their integument surface using scanning electron microscopy (SEM). The specimens showed structural adaptation based on changes in integument surface, probably to protect against damage induced by the toxic effects of albendazole. This finding was published in *PLoS One*.



A white-handed gibbon found in Khao Yai National Park, Thailand

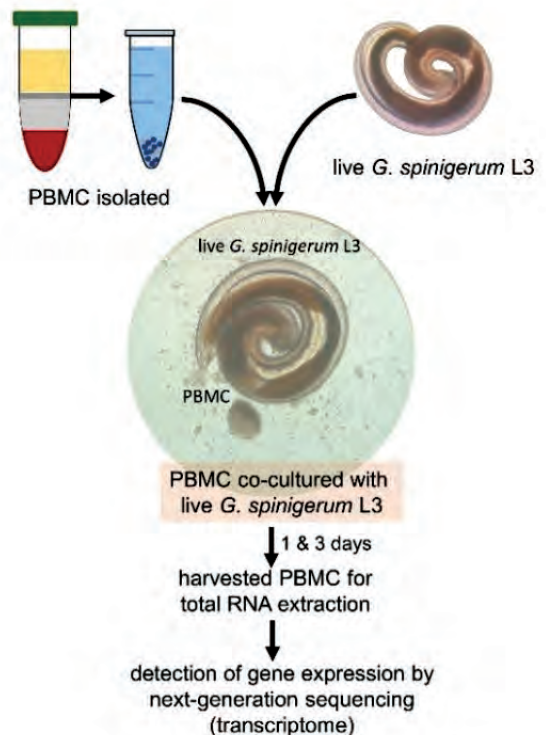
- Assoc. Prof. Aongart Mahittikorn partnered with the University of Florence, Italy, to study microbial composition and parasitic diversity in wild white-handed gibbons, in the period 2022-2025. The team has collected gibbon samples in Khao Yai National Park, Thailand.
- Researchers at the Department of Helminthology worked on the advancement of DNA barcoding for parasitic helminths to improve the accuracy of DNA-based taxonomy and molecular diagnostic analysis. For this research, they published two papers in *Parasites & Vectors* and one paper in *BMC Genomics* journals.
- In 2021, Assoc. Prof. Supaluk Popruk published a highly-cited review on the epidemiology and subtype distribution of *Blastocystis* in humans in the journal *Infection, Genetics and Evolution*. The review suggested that future epidemiological and subtyping studies could reveal new molecular subtypes (STs) in humans as well as possible associations of STs with disease, drug resistance and related mechanisms, such as protease activity. Currently, the paper has been cited in 17 publications.



BACTERIAL AND FUNGAL DISEASES

- A review article from Prof. Narisara Chantratita highlighted the associations between human leukocyte antigen (HLA) class I and class II alleles and susceptibility to important infectious diseases, such as tuberculosis, leprosy, melioidosis, *Staphylococcus aureus* infection, human immunodeficiency virus infection, coronavirus disease 2019, hepatitis B and hepatitis C, in populations worldwide. It also discussed the challenges in HLA typing to predict disease outcomes in clinical implementation and suggests that the evaluation of the impact of HLA variants on the outcome of bacterial and viral infections would improve the understanding of pathogenesis and identify those at risk from infectious diseases in distinct populations, and may improve individual treatment.
- The antimicrobial-resistant and virulent genotypes and phenotypes of *Salmonella* isolated from retail food samples in Bangkok, Thailand were investigated by Assoc. Prof. Nitaya Indrawattana and colleagues. The results of their study supported the suspected divergence of *Salmonella* serotypes isolated from a variety of raw food samples from the open market and hypermarket in Bangkok and its periphery. The findings also provided insight into the molecular characterization of virulence- and drug-resistance traits, as well as the antimicrobial susceptibility pattern of the bacterial pathogen.
- Prof. Narisara Chantratita and colleagues' research entitled "Blood transcriptomics to characterize key biological pathways and identify biomarkers for predicting mortality in melioidosis" provided new knowledge about transcriptional host responses in circulating leukocytes from hospitalized melioidosis patients and suggests several candidate biomarkers for further study. The results of their research can be found in the journal *Emerging Microbes and Infections*.

- Dr. Wiwat Chanchaoenthana is studying the host immune response in tuberculosis patients to evaluate potential biomarkers or parameters that could be a dynamic biomarker response to tuberculosis infection, including single-cell analysis.
- Dr. Wiwat is also developing a high-yield molecular technique for latent tuberculosis (TB) and a TB resistance diagnostic tool using miRNA-based electrochemical method and EX-PAR integrated with CRISPR/Cas. This disrupted intervention (non-sputum-based test) will promote a new era of precision diagnostics and treatment for TB in Thailand.
- Assoc. Prof. Yaowapa Maneerat investigated human gene profiling related to the immune response against *Gnathostoma spinigerum* third-stage larvae (*G. spinigerum* L3) in peripheral blood mononuclear cells co-cultured with live *G. spinigerum* L3 using next-generation sequencing analysis. The study has linked the feasible properties



of some interesting genes (based on the reference database) to pathogenesis and/or immuno-evasion strategies of *G. spinigerum* L3 in gnathostomiasis. This study will elicit a better understanding of how *G. spinigerum* L3 develop pathogenesis in human gnathostomiasis, and inform approaches to protection and/or treatment.

- *Caenorhabditis elegans* DAF-16 regulates lifespan and immune responses to *Cryptococcus neoformans* and *Cryptococcus gattii* infections- a study by Asst. Prof. Thitinan Kitisin and Assoc. Prof. Passanesh Sukphopetch discovered. The findings, which are published in *BMC Microbiology*, demonstrated that by using *C. elegans* as an *in-vivo* model, it was possible to explore the intrinsic link between longevity and immunity at the molecular level, in which alteration of this evolutionarily conserved longevity pathway, may deepen our understanding of the host-pathogen interaction.
- Assoc. Prof. Pornpan Pumirat and colleagues discovered that cycle-inhibiting factor (Cif) is associated with *B. pseudomallei* invasion of human neuronal cells. Their findings enhance our understanding of *B. pseudomallei* pathogenicity in terms of virulence factor Cif and demonstrate the function of Cif in neurological melioidosis. This may eventually lead to the discovery of novel targets for treatment and a strategy to control the disease.
- A cohort study led by Dr. Janjira Thaipadungpanit is screening non-sputum-based assays and monitoring treatment in a prospective cohort of pulmonary tuberculosis (PTB) cases. They are investigating the diagnostic sensitivity and specificity of LAMP assay in oral swabs at primary screening compared with SSM among 500 presumptive PTB patients. They also monitor potential treatment with LAMP assay in oral swabs at routine follow-up visits after oral drug treatments in at least 80 bacteriological confirmed PTB cases.

FOOD AND NUTRITION



- A research study by Assoc. Prof. Onrapak Reamtong and Assoc. Prof. Pattaneeya Prangthip, published in *Scientific Reports*, showed that *L. acidophilus* and inulin improved lipid profiles and reduced serum concentrations of inflammatory markers in high-fat diet-fed rats. The study suggests that *L. acidophilus* and inulin may represent effective natural means of managing inflammation and dyslipidemia.
- An antimicrobial peptide CM-A, modified by Asst. Prof. Amornrat Aroonnuan and Ms. Sirirak Arthithanyaroj, exhibited effective antimicrobial activity against *Clostridioides difficile*, an infection that is the most common cause of nosocomial and antibiotic-associated diarrhea. The results, published in *PLoS ONE*, determined that the antimicrobial peptide CM-A may represent a promising novel approach to treating *C. difficile* infections.
- Researchers at the Department of Tropical Nutrition and Food Science determined the relationships between single nucleotide polymorphisms (SNPs), including rs5498 and rs281432, on intercellular adhesion molecule 1 gene (*ICAM1*) and atherosclerotic cardiovascular disease (ASCVD) susceptibility in patients with hypercholesterolemia (HCL). In their study, published in *PeerJ*, they found that

positive dominant model rs5498 participants had double the risk of HCL, the G allele in *ICAM1* rs5498 may be associated with higher risk of ASCVD among Thai people with HCL, and also positively associated with *ICAM1* mRNA expression, LDL-C concentration, and resting heart rate.

- In collaboration MU-KMUTT Biomedical Engineering & Biomedicals Consortium, researchers of the Department of Tropical Nutrition and Food Science are investigating the bioactive compounds in commercial Thai edible flowers. They are also studying the short chain fatty acid occurring in the process of fermenting soybean meal in food “Thuanao” from natural microbiome, including its usefulness in health and nutrition and their impact on human metabolism.



ENVIRONMENT, CLIMATE CHANGE, AND HEALTH

- In collaboration with Australia and Japan, Assoc. Prof. Kraichat Tantrakarnapa is leading an e-Asia Joint Research Program entitled, ‘Health impacts of climate change in Thailand: current impacts and its implication’. Asia is one of the most vulnerable regions to climate change in the world. However, evidence about the impacts of climate change on human health is quite limited for this region. This 3-year project examines current evidence on temperature and human health, projects future health risks associated with temperature under climate change, and assesses the health benefits of mitigation policies in Asia.
- Assoc. Prof. Athit Phetrak and colleagues investigated the performance of a membrane bioreactor for leachate treatment in practical operation for prolonged sludge-retention

time under restricted aeration. The treatment system can confer low-energy consumption, reduced sludge generation, and provide the potential for water reuse. The outcome of this study was published in the Q1 journal *Chemosphere*, in the field of environmental science.

- Assoc. Prof. Athit Phetrak and colleagues also explored the effects of brewing conditions on infusible fluoride levels in tea and herbal products. Their study revealed that the level of infusible fluoride during brewing was inversely associated with the leaf size of the tea and herbal products. Furthermore, the type of water used influenced the release of infusible fluoride; purified water yielded lower amounts of infused fluoride.
- Asst. Prof. Thammanitchpol Denpetkul received a Kuria Overseas Research Grant of 400,000 JPY for a project characterizing the health risks involved in recreational swimming at east-coast beaches in Thailand using quantitative microbial risk assessment. He was awarded a grant of 900,000 THB from the National Research Council of Thailand for material flow analysis and studying the components of municipal solid waste in central Thailand. The study aimed to provide insights into the composition and flow of solid waste in the region and identify opportunities for waste reduction and management.



Seawater sampling and beach survey

INNOVATION AND SOCIAL IMPACT

- Finding treatments for COVID-19: A phase 2 multi-center controlled adaptive platform trial in early symptomatic COVID-19 (PLATCOV) is being conducted to assess the antiviral pharmacodynamics of medications against SARS-CoV-2. The trial started in the Hospital for Tropical Diseases in September 2021, and has recruited nearly 900 patients, the majority from this site. The study also has sites in Brazil, Lao PDR, and a more recently, in Pakistan. The trial is sponsored by the University of Oxford and the COVID-19 Therapeutics Accelerator through the Wellcome Trust. The study is led by the Mahidol Oxford Tropical Medicine Research Unit (MORU) in collaboration with the departments of Tropical Hygiene, Clinical Tropical Medicine, and Molecular Tropical Medicine and Genetics.

The study has successfully assessed Ivermectin (not antiviral), Remdesivir (antiviral), Regeneron (antiviral against delta, and BA.2/BA.5), Favipiravir (not antiviral), Molnupiravir (antiviral) and Paxlovid (strongly antiviral).

In an inferiority/ non-inferiority comparison with Paxlovid, Molnupiravir was shown to have inferior antiviral activity. The study continues to assess Evusheld, Fluoxetine, Nitazoxanide (outside Thailand) and Ensitrelvir, and is providing useful comparative assessments of antiviral efficacy like no other current study.

The study is planned to continue until 2026, and is currently assessing the same successful methodology against Influenza, in the PLATCOV sub-study, Adaptive Assessment of Treatments for influenza: A phase 2 multi-center adaptive randomized platform trial to assess antiviral pharmacodynamics in early symptomatic influenza infection (AD ASTRA).



Photo credits to MORU

- Assoc. Prof. Wirichada Pan-ngum and a team of researchers from the Department of Tropical Hygiene and the Mathematical and Economic Modelling group are part of the research consortium Strengthening Preparedness in the Asia Pacific Region through Knowledge (SPARK). The SPARK consortium has provided numerous opportunities for individuals in the Asia-Pacific region to connect with globally renowned public-health institutions in Australia and the Asia-Pacific region. At the junior level, SPARK supports a significant number of Southeast Asian students to pursue the Biomedical and Health Informatics Program (BHI) at the Faculty of Tropical Medicine, Mahidol University. In this project, they have been working closely with experts in malaria modeling to conduct and publish their research to the scientific community. The Department of Tropical Hygiene has been collaborating with the SPARK consortium to co-create comprehensive training programs that emphasize mathematical modeling and other essential technical modeling skills. Three scholarships for the MSc. in Biomedical and Health program (BHI) were provided to three students, 2 from Indonesia, and 1 from Myanmar. Research projects relating to mathematical modeling have been conducted with researchers from Bangladesh and Thailand.

- The Department of Defense (DoD), USA, funded an innovative project led by Research Prof. Jetsumon Prachumsri and Assoc. Prof. Wang Nguitragoon, which implemented mass drug administration of ivermectin to over 3,000 volunteers in Surat Thani. The project targeted major malaria vectors to effectively reduce parasite transmission. In conjunction with this effort, over 50,000 blood samples were collected for comprehensive molecular analysis. Although the malaria parasite positivity rate was low, our investigation uncovered intriguing findings of various co-infections, including Dengue, Zika and scrub typhus. These results shed light on the prevalence of infectious diseases and underscore the significance of comprehensive healthcare interventions, emphasizing the efficacy of ivermectin as a tool for vector control.



- The Mass Primaquine Preventive Treatment (MPPT) trial, funded by the US NIH and directed by Research Prof. Jetsumon Prachumsri and Dr. Wanlapa Roobsoong, is a cluster-randomized cross-over trial aimed at assessing the effectiveness and operational feasibility of Primaquine MDA (Mass Drug Administration). The study observed a reduction in *P. vivax* incidence in the intervention arm, although the difference was not statistically significant compared to the control arm. Moreover, the findings revealed the presence of numerous

asymptomatic cases that went undetected by routine passive case detection-based malaria surveillance systems. These results highlight the importance of future MDA-based preventive measures. Additionally, the study provided new insights into the prevalence and distribution of G6PD deficiency in the study populations, which diverged from previously reported data. The pilot study's value has been acknowledged by health authorities at both the ministerial and local levels, leading to subsequent evidence-based actions derived from this research.

- Assoc. Prof. Wang Nguitragoon took part in leading the development of an mRNA vaccine to stop the transmission of *P. vivax*. The project, directed by Research Prof. Jetsumon Prachumsri of the Mahidol Vivax Research Unit (MVRU) with funding from Global Health Innovation Technology Fund (GHIT) was completed successfully. The vaccine showed strong promise, eliciting higher transmission-blocking than previous-generation vaccines. A patent application and publications are being prepared.

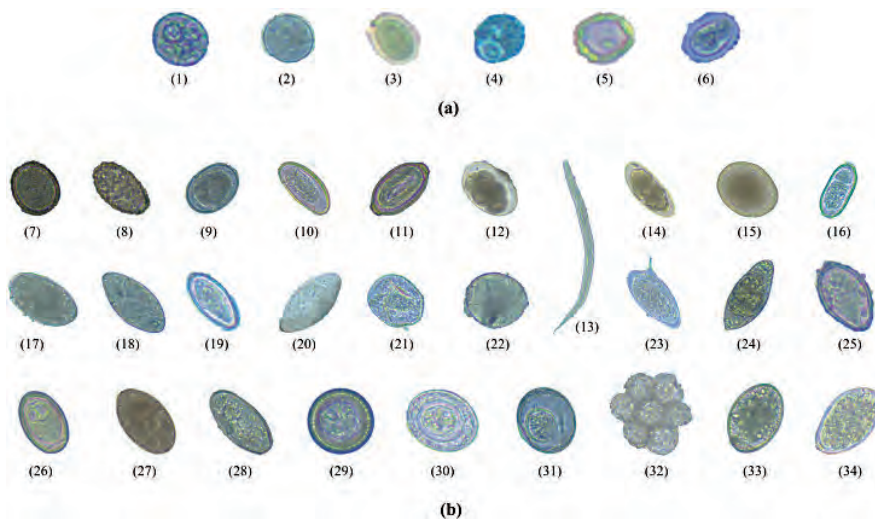


- Using spatial risk assessment integrated with a mobile app, Mr. Amnat Khamsiriwatchara and Assoc. Prof. Jaranit Kaewkungwal of BIOPHICS identified the potential areas for African Swine Fever (ASF) introduction and transmission in Thailand. Through farm

assessments and integrating the outputs with the necessary spatial layers, they developed a spatial analysis on a web-based platform that helped facilitate disease prevention planning for the relevant governmental authorities.

- Assoc. Prof. Dorn Watthanakulpanich and team developed a YOLOv4-Tiny model, as an automated object detection approach for automatically recognizing intestinal parasitic

products in stools. It was the first to detect protozoan cysts and helminthic eggs in 34 classes of intestinal parasitic objects in human stools. The YOLOv4-Tiny produces faster results and uses less memory with the support of low-end GPU devices. This innovation has been patented and joined the national innovative product presentation in 2022.



The total 34 classes of parasitic objects: (A) protozoan cysts and (B) helminthic eggs.

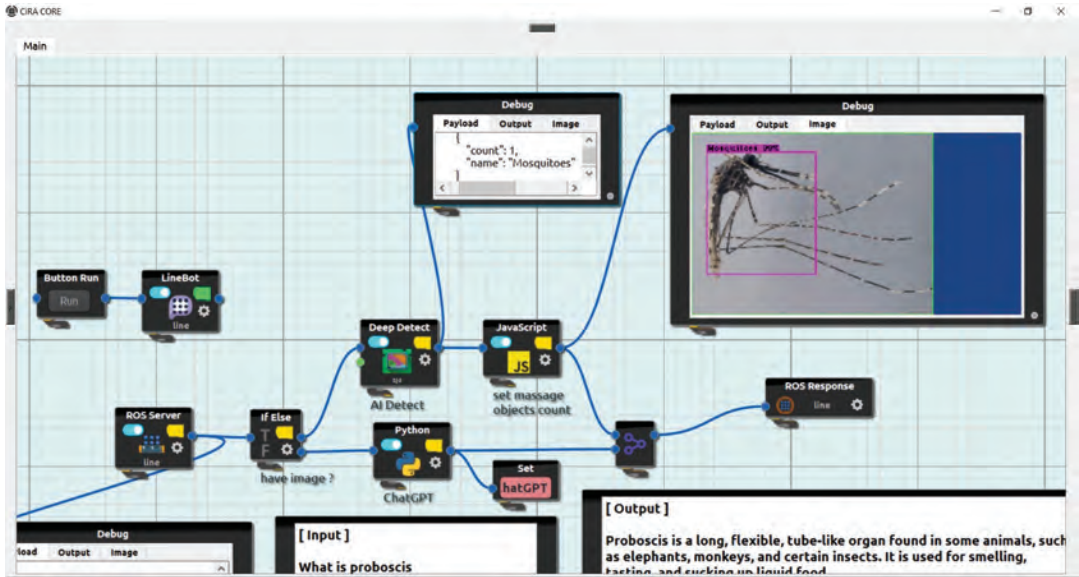
- Assoc. Prof. Pornsawan Leangwutiwong and colleagues developed serotype-specific immunochromatography systems for all four DENV serotypes. The detection for each system is 15 minutes using laboratory and clinical isolates of DENV with serotype specificity of almost 100%. They found no co cross-reaction between DENV serotypes in DENV isolates and no cross-reaction with chikungunya, Japanese encephalitis, Sindbis, and Zika viruses. These assay systems could accelerate both the diagnosis of DENV infection and epidemiologic studies in DENV-endemic areas.
- Prof. Mallika Imwong and colleagues conducted a longitudinal study of genetic resistance markers in the Greater Mekong

Subregion, covering the evolution of multidrug resistance in *Plasmodium falciparum*. They found that Cambodia had the highest piperazine resistance-associated *PfCRT* mutations (86%) in 2015; this declined to 38% after first-line treatment was changed from dihydroartemisinin-piperazine to artesunate-mefloquine (ASMQ), between 2014 and 2017. This supports the development of ASMQ plus piperazine as a triple artemisinin combination therapy. This highly-cited paper was published in *Antimicrobial Agents and Chemotherapy*.

- Assoc. Prof. Sumate Ampawong's work focused on the development of an alternative therapeutic form for the treatment of psoriasis in animal model using sericin, a natural

biopolymer from *Bombyx mori* (domestic silk moth) cocoon. The results demonstrated that sericin inhibits keratinocyte hyper-proliferation and inflammation through the mTOR pathway and Th17 differentiation signaling. This provides a potentially promising modality for treating psoriasis due to the favorable properties of sericin for its anti-psoriatic effects and stimulation of healing.

- Assoc. Prof. Patchara Sriwichai and Mr. Songpol Eiamsamang developed and constructed an application platform with report format for mosquito-vector identification using a deep learning (AI) creative system. This will be applied and combined with the vector-borne disease surveillance system in field work.



- Assoc. Prof. Nitaya Indrawattana and colleagues developed an immunochromatographic antigen detection test kit (ICT AgTK) that targets the *O. tsutsugamushi* 60 kDa GroEL chaperonin (heat shock protein 60). The ICT AgTK is easy to perform with rapid turn-around time. It has the potential to be used as an important tool for on-site and early scrub typhus diagnosis, especially in resource-limited healthcare settings. Dr. Nitaya has applied for a patent for the invention.
- The Department of Helminthology participated in the research exhibition and translation under the topic “10 Years of Research Cooperation on Health and Well-Being in Saen Thong Subdistrict: Learning, Conservation and Sustainable Development” at Tha Wang Pha District Office, Nan Province, 4-5 August 2022.

The Department provided knowledge and guidelines for preventing parasitic diseases to around 500 participants, including students from various schools and people from the local area who attended the event.



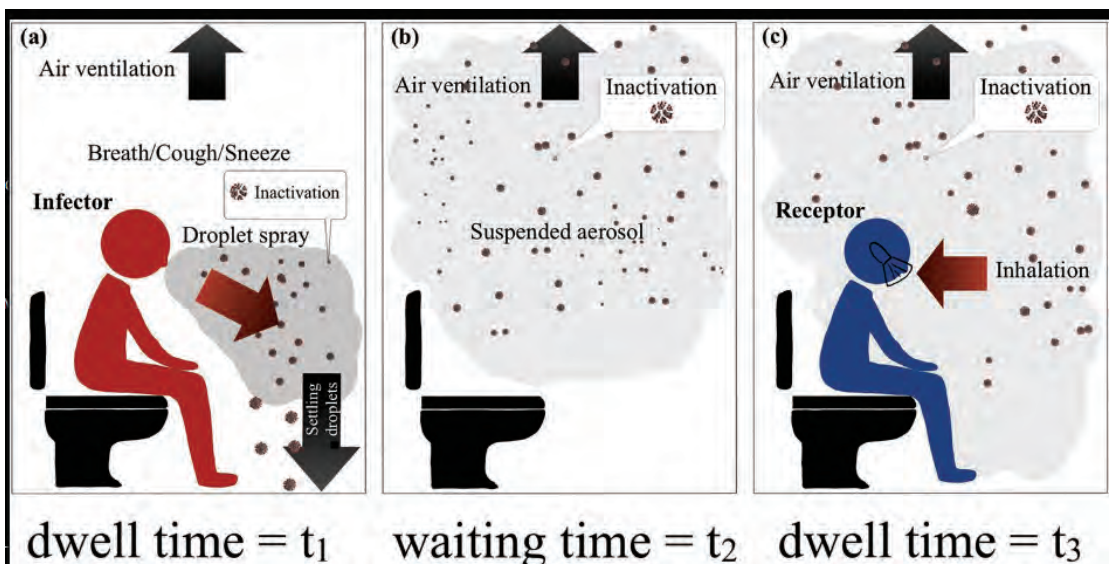
- The Department of Tropical Nutrition and Food Science created instructional media for health promotion and COVID-19 prevention for migrant workers in Thailand. The media are created in five languages--Thai, Lao, Khmer (Cambodian), Burmese, and English. The Department also conducted training for 100 Myanmar migrant health volunteers in Samut Sakhon Province and 30 Thai-Karen health volunteers in Ratchaburi Province.

In collaboration with the Center for Medical Genomics under the Faculty of Medicine Ramathibodi Hospital, the Department conducted surveillance of corona-virus variants in Thailand.

- Assoc. Prof. Saengduen Moonsom and colleagues explored the seasonal prevalence, risk factors, and One Health (OH) intervention for the prevention of intestinal parasitic infections (IPI) in underprivileged communities along the Thai-Myanmar border. They reported the successful application of the One Health intervention (including knowledge, attitudes, and practices (KAP) of the community, training in microscopic diagnosis, and stakeholder engagement for IPI prevention) in reducing the prevalence of IPI and mitigating disease-

related risks. The intervention may be applied to address other infectious diseases in the future.

- The Department of Protozoology conducted molecular detection of *Cryptosporidium spp.*, *Giardia duodenalis*, and *Enterocytozoon bieneusi* in school children at the Thai-Myanmar border. The study indicated that children at the Thai-Myanmar border from Ratchaburi Province, Thailand are infected with diverse zoonotic genotypes of *Cryptosporidium spp.*, *G. duodenalis*, and *E. bieneusi*.
- Asst. Prof. Thammanitchpol Denpetkul's research on the prevention of COVID-19 transmission when using public toilets has gained significant attention through various channels, including a Facebook Live presentation and coverage in multiple online news articles. His research involved a quantitative microbial risk assessment that investigated the effects of face masks and ventilation on the risk of respiratory SARS-CoV-2 transmission in public toilets. The findings highlight the importance of wearing masks and ensuring adequate ventilation when using public toilets to reduce the risk of COVID-19 transmission.



- BIOPHICS is working with the Division of Vector-borne Disease Control under the Ministry of Public Health of Thailand in monitoring malaria in the country using mHealth Malaria online. BIOPHICS will perform technical support for operations staff to use the mobile application in focal areas for malaria elimination.
- Dr. Rapatbhorn Patrapuvich has a research agreement to support the NIH International Center of Excellence for Malaria Research (ICEMR) for South Asia during Jan 2020 to March 2024. She has established drug assay models to study multiple stages of malaria parasites used to evaluate the susceptibility and resistance to antimalarial control measures. Together with regional research partners, the MESA-ICEMR program exemplifies the impact of research and innovation on local malaria-control policy.
- In collaboration with the Department of Livestock Development, BIOPHICS developed “e-smartplus Version2”, a mobile application for risk assessment of pig farms throughout Thailand to prevent African Swine Flu Virus (ASF) outbreaks.
- The Department of Microbiology and Immunology developed diagnostic kits for melioidosis using detection with antigen, antibody, and PCR.
- Genomics and Evolutionary Medicine (GEM) is part of the team building a SARS-CoV-2 genome analysis workflow on the Thai Supercomputer facility, improving surveillance capacity in Thailand and neighboring countries.

TRANSLATION AND COMMERCIALIZATION

- Assoc. Prof. Pannamthip Pitaksajjakul and her Ph.D. student, Ms. Rochanawan Sootichote have developed Novel Therapeutic Human Antibody against Dengue virus that could neutralize the virus during the viremia phase during the first 7 days of infection. It could also reduce dengue severe symptoms, such as platelet declination, plasma leakage, and virus-infected cells after 7 days' infection. This new therapeutic antibody has been patented and also published in *Biomedicines*. Among over 100 applicants, this novel Therapeutic Human Antibody project was selected to be one of 8 innovations to join the “Lab to Market, Business Incubation Program” arranged by the Yothi Medical Innovation District (YMID). The new spinoff company, namely “InterWisdom”, is setting up to translate and commercialize this novel NhuMAB.

YMID ย่านนวัตกรรมการแพทย์โยธี
YOTHI MEDICAL INNOVATION DISTRICT "ศูนย์กลางย่านนวัตกรรมการแพทย์: ท้าววิชัย-ตุลโลก"

Center of Excellence for Antibody Research
CEAR
Faculty of Tropical Medicine, Mahidol University

แอนติบอดีมนุษย์รักษาไข้เลือดออก
Therapeutic antibodies against dengue

Neutralizing Human MABs (NhuMABs)

White blood cells NhuMABs Viruses No Infection

90-100% killing activity DENV1-4

Pre-clinical test in mice and monkey

GMP production by BSV-Biosciences Company (USA)

Ongoing Safety & Toxicity tests before Phase 1 trial

Contact; Dr. Pongrama Ramasoota
Director, CEAR, Mahidol University
Tel 081-5527589
E-mail pongrama.ram@mahidol.ac.th
<https://www.youtube.com/watch?v=Slyzoi15D5o>

Patent Dengue-virus serotype neutralizing antibodies
WO 2018205543 A3

Issued in:	Publications online:
1. USA	AgBioScience
2. Japan	PLoS ONE
3. Australia	PLoS ONE
4. India	PLoS ONE
5. Indonesia	PLoS ONE
6. Malaysia	PLoS ONE
7. Philippines	PLoS ONE
8. Singapore	PLoS ONE
9. Vietnam	PLoS ONE
10. Laos	PLoS ONE
11. Thailand	PLoS ONE

Application countries: USA, Japan, Australia, India, Indonesia, Malaysia, Philippines, Singapore, Vietnam, Laos, Thailand

Applicant: BSV-Biosciences Company (USA)

Agent/Attorney: BSV-Biosciences Company (USA)

Expert/Consultant: BSV-Biosciences Company (USA)

- Assoc. Prof. Pongrama Ramasoota received a grant from the Japan International Cooperation Agency (JICA) for the project “The Capacity Building of Antibody against SARS-CoV-2 virus”. The grant enabled a new biosafety level 2+ laboratory to be built, and sophisticated equipment, such as a Cyto-Mine single cell analysis and antibody production system (1st in Asia), cell sorter, and industrial-scale protein-purification system. The team obtained new neutralizing human monoclonal antibody (NhuMAb) against SARS-CoV-2 virus from blood of vaccinated and Covid-19 recovered volunteers using phage display and hybridoma technologies. The project is conducting large-scale production and further characterization of NhuMAb.
- Asst. Prof. Santi Maneewatcharangsri invented an rGroEL IgM-ELISA test that can detect anti-GroEL IgM antibodies in the serum of suspected leptospirosis AUI (acute undifferentiated febrile illness) patients during the first week of fever and differentiate leptospirosis from other tropical diseases sharing similar non-specific febrile illness symptoms, such as scrub typhus, melioidosis, dengue fever, malaria, and influenza. The rGroEL IgM-ELISA antigen provides high diagnostic sensitivity (91.84%) and specificity (92.59%) compared with the culture method. The rGroEL1-524 antigen also demonstrated early IgM detection, as early as 1-3 to 7-11 DPO at 92.3%–100% sensitivity. The patent for this invention is being processed by the Department of Intellectual Property, Ministry of Commerce, Thailand.



- A mosquito repellent spray and balm product developed by the Department of Medical Entomology has been launched by the Faculty brand “MosShield” on the theme “Natural product with reliability”. This is translational research for community use and service commercialization. The Department also has collaborations with the private sector to implement a research-based product of spatial repellent in the local community to reduce human-mosquito dengue contact.



TROPMED SUSTAINABLE DEVELOPMENT GOALS

The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate change, environmental degradation, peace and justice. The 17 Goals are all interconnected, and in order to leave no one behind, it is important that we achieve them all by 2030.

THE GLOBAL GOALS For Sustainable Development



THE GLOBAL GOALS
For Sustainable Development

GOAL 3: GOOD HEALTH AND WELL-BEING



The Faculty of Tropical Medicine is committed to achieving Goal 3 of the United Nation's Sustainable Development Goals 2030, which aims to ensure healthy lives and promote well-being for all at all ages.

The Faculty mainly contributes to the global effort of meeting the targets under Goal 3, especially targets 3.3 Fight Communicable Diseases and 3.B Support Research, Development and Universal Access to Affordable Vaccines and Medicines.

TARGET 3.3 FIGHT COMMUNICABLE DISEASES

TARGET 3.3



FIGHT COMMUNICABLE DISEASES

The objective of Target 3.3 is to end epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases, and to combat hepatitis, water-borne diseases and other communicable diseases, by 2030.

The communicable-disease research focus of the Faculty encompasses tropical diseases and infectious diseases, such as malaria, dengue, HIV/AIDS, tuberculosis, leptospirosis, neglected tropical diseases, and other infectious diseases. During the COVID-19 pandemic, the Faculty conducted research and projects to combat the spread of the virus, increase public awareness, and reduce mortality.

The Faculty has been a key player in numerous important COVID-19 research studies in Thailand, such as diagnostics tests, treatment and drug development. The Faculty has also been involved in several international research collaborations.

Over the years, the Faculty's efforts in eliminating malaria have made a significant impact in Thailand, regionally and internationally. The Faculty's work on malaria includes epidemiology and data management, diagnostics, vector control, treatment, drug and vaccine development. The research results of the Faculty inform and influence Thailand's policy making and planning.

Faculty researchers are also utilizing innovative approach in their work. One example is the Malaria Mobile health application, a mobile active-response tool for healthcare staff to fight malaria. This tool will take daily action at individual level, as defined in the WHO elimination surveillance guidelines. More information about the work of Faculty in other communicable diseases can be found in the *Research and Innovation and Social Impact* section of this report.

TARGET 3.B SUPPORT RESEARCH, DEVELOPMENT AND UNIVERSAL ACCESS TO AFFORDABLE VACCINES AND MEDICINES

TARGET 3.B



SUPPORT RESEARCH, DEVELOPMENT AND UNIVERSAL ACCESS TO AFFORDABLE VACCINES AND MEDICINES

The Faculty conducts, supports, and leads clinical trials of several vaccines and drugs from Thailand and worldwide.

The clinical trials of various vaccines conducted by Faculty researchers in 2021-2022 include:

- Phase 2 multi-center adaptive platform trial to assess antiviral pharmacodynamics in early symptomatic COVID-19 (PLATCOV)
- Cardiac manifestations in adolescents after Pfizer COVID-19 injection in Thailand
- Phase 3 trial of the Takeda dengue vaccine
- Phase 2 trial in new generation rabies vaccine (VRVg)
- Phase 2 trial in Japanese encephalitis vaccine

- Phase 1 trial of an inactivated recombinant Newcastle disease virus vaccine expressing SARS-CoV-2 spike
- Phase 1 and 2 trials of GPO NDV-HXP-S vaccine in adults aged 18-75 years in Thailand
- 5-year follow up after a single dose vaccination of acellular pertussis vaccines

Clinical trials of respiratory syncytial virus (RSV), COVID-19, dengue, and malaria vaccines are ongoing at the Faculty.

The Faculty's Mahidol Vivax Research Unit (MVRU) leads the Malaria Infection Study in Thailand (MIST), which is a research program to accelerate the development of vaccine(s) and drug(s) for *Plasmodium vivax* infection. MIST is committed to accelerating the path to a malaria cure by initiating Thailand's first human infection study.

The Faculty collaborated with the National Vaccine Institute of Thailand to develop the Vaccine Information System (VIMS), which will collect a comprehensive range of vaccine information and consolidate it at one web portal. Users can use the web portal as one-stop source of vaccine information. VIMS can serve as a model for other countries to assess their vaccine situations independently, and as a guideline for vaccine usage within their own countries.

With its numerous successful clinical trials recorded over the years, the Faculty has made a significant impact in the fields of drug and vaccine development. According to the study 'Vaccine Technology Platform and Roadmap' by Prof. Emer. Punnee Pitisuttithum, Former Head of the Vaccine Trial Centre (VTC), Thailand can strengthen its local vaccine production and research and development capabilities through local and international collaborations, partnerships, and public-private investment at each stage.

GOAL 13: CLIMATE ACTION



The Faculty is also contributing to efforts to achieving Goal 13: take urgent action to combat climate change and its impacts.

The Department of Social and Environmental Medicine leads the research on climate change and its impact on public health. The Department also organizes local and international workshops on climate action, including air quality management and environmental chemicals and human health.

TM Green is a major Faculty initiative towards meeting the objectives of Goal 13. It initiates public awareness campaigns about the environment and communicates strategies and methods of energy conservation to staff and students at the Faculty.

TARGET 13.2 INTEGRATE CLIMATE CHANGE MEASURES INTO POLICIES AND PLANNING



The Faculty leads a project that assesses the health impacts of climate change in Thailand and its implications. This project is examining current evidence on temperature and human health, projections of future health risks associated with temperature increase with climate change, and assesses the health benefits of mitigation policies in Asia.

On 24 August 2022, the Faculty of Tropical Medicine, Mahidol University was given the award “MU Green Ranking 2021 (Honorable Mention Prize)” during the Mahidol Sustainability Development Conference 2022, held at Prince Mahidol Hall, Mahidol University (Salaya Campus).

On this occasion, Assoc. Prof. Kraichat Tantrakarnapa, Deputy Dean for Facilities and Environment, Faculty of Tropical Medicine attended the Conference and accepted the award from Prof. Banchong Mahaisavariya, President of Mahidol University, on behalf of the Faculty.

In 2022, the Department of Tropical Hygiene became part of “The Network of Excellence in Advanced ICT for Tropical Medicine”, supported by the German Academic Exchange Service (Deutscher Akademischer Austauschdienst – DAAD) SDG Partnerships, One Health.

The main partners of the network comprise the University of Bremen, Germany and Mahidol University, Thailand, while other partners include the Southeast Asia One Health University Network (SEAOHUN), Department of Disease Control, Ministry of Public Health, Thailand, Department of Livestock Development, Thailand, Faculty of Veterinary Medicine, Vietnam National University of Agriculture, Vietnam, and VetAgro Sup (an engineering college in France).

The goals of the networks are to strengthen the ability of Mahidol University and other relevant government agencies in Southeast Asia to pursue a One Health approach to addressing tropical diseases and vitally important zoonoses through education and research, to address SDG 3 (Good health and well-being), SDG 4 (Quality Education), and SDG 17 (Partnerships for the Goals), and to create a network of excellence in advanced information technology for tropical medicine worldwide.



In addition, the Faculty also employs a culture of sustainability (all targets) through learning, research, social engagement, and institutional commitments. For example, the Faculty installed a solar roof energy for the Hospital for Tropical diseases, which will be beneficial for global environment as indicated in target 7 (affordable and clean energy).

TROPMED ON THE INTERNATIONAL STAGE

AWARDS



- Prof. Emer. Punnee Pitituttithum, Prof. Polrat Wilairatana, and Prof. Kesinee Chotivanich were included in the World's Top 2% of Scientists (Career-long Citation Impact 2022) by Stanford University. Prof. Punnee and Prof. Kesinee were also in the World's Top 2% of Scientists (Single Year Citation Impact 2022).



- Prof. Polrat was bestowed Fellow of the American College of Gastroenterology (FACG) by the American College of Gastroenterology (ACG).



- On October 29, 2022, Asst. Prof. Santi Maneewatchararangsi won a Silver Award and the Best Video Presentation Award in the International Invention and Innovative Competition (InIIC Series 2/2022) for his invention "Recombinant GroEL-antigen IgM-ELISA test kit for acute leptospirosis diagnosis" in the category of Professional Science, Engineering & Technology. The event was organized by the MNNF network, Malaysia.

- Dr. Sirasate Bantuchai was accepted to the Science and Technology in Society (STS) Young Leaders Program, which brought together outstanding young promising leaders

at the STS forum Annual Meeting in Kyoto, Japan in 2022. Dr. Sirasate was recommended by the National Research Council of Thailand.



CONFERENCES AND WORKSHOPS

- On 20-23 June 2022, Assoc. Prof. Pongrama Ramasoota and Assoc. Prof. Pannamthip Ramasoota presented at the Immunotherapy for Infectious Diseases Conference (IIDC) 2022, held in the University of Pavia, Italy. Dr. Pongrama spoke on “Therapeutic human antibody against dengue virus; toward commercialization”, while Dr. Pannamthip presented “Therapeutic human antibody against NS1 protein of dengue virus” in the poster sessions.

At the same conference, Miss Rochnawan Sootichote, a Ph.D. student of Assoc. Prof. Pannamthip Pitaksajjakul received the Best Poster Presentation Award.



- Dr. Wanlapa Roobsoong presented her research “Experimental tools for exploring live-stage biology of *Plasmodium vivax*” at the 8th International Conference on *Plasmodium vivax* Research (ICPvR) 2022 held in Melbourne, Australia.



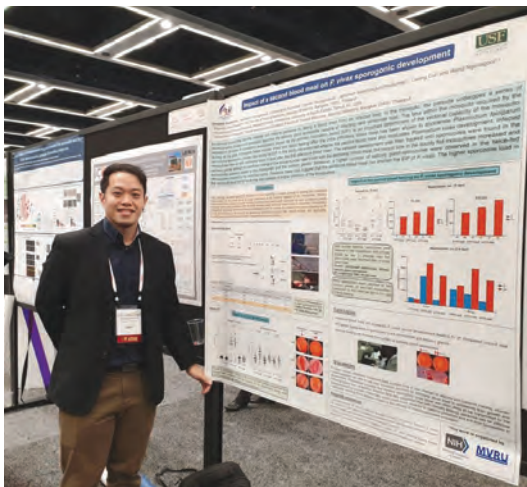
- Assoc. Prof. Patchara Sriwichai presented at the ACM International Conference on Information Technology for Social Good (Good IT) 2021, 9-11 September 2021, in Rome, Italy. She won a Best paper award for her study “A lightweight deep learning approach to mosquito classification from wingbeat sounds”.



- Assoc. Prof. Patchara Sriwichai presented her study “Strengthening vector surveillance for malaria elimination” at the 5th International Symposium of the Benthological Society of Asia, 27-29 December 2022 in Chiang Mai, Thailand.
- Assoc. Prof. Kraichat Tantrakarnapa presented and chaired at several international conferences on the environment, health impact, and climate change. He presented at the 7th Indian International Conference on Air Quality Management IICAQM 2022 in Chennai, India, at the CEPHA Symposium on Environmental

Epidemiology and Health Risk, in Kuala Lumpur, Malaysia, and at the 1st Annual Conference of the Asia Pacific Network for Climate Health at Monash University, Melbourne, Australia, to name a few.

- Dr. Sirasate Bantuchai presented a poster entitled “Impact of a second blood meal on *P. vivax* sporogonic development” at the American Society of Tropical Medicine and Hygiene Annual Meeting held in Seattle, USA.



- At the 22nd IUNS-International Congress of Nutrition held in Tokyo, Japan on 6-11 December 2022, Assoc. Prof. Karunee Kwanbunjan and Dr. Pornpimol Panprathip Phienluphon presented their oral presentation entitled “Glutamate content in Thai and German condiments” and “Effect of nutrition, TNF- α -308G>A, and TNFRSF1B 196T>G polymorphisms to the susceptibility of type 2 diabetes mellitus in rural Thais: a cohort study”, respectively. Naruemon Wechjakwen and Natnicha Promyos presented posters at the same conference.



- Assoc. Prof. Saranath Lawpoolsri Niyom attended a kick-off meeting of the study group “Intelligent Systems for Vector-Borne Diseases” at the Hanse-Wissenschaftskolleg Delmenhorst (HWK), Germany, June 21 and 22, 2022. At this kick-off meeting, Dr. Saranath provided a presentation on “The needs for mosquito monitoring”.
- Assoc. Prof. Saranath Lawpoolsri Niyom participated in a workshop and summer school for “The Network of Excellence in Advanced ICT for Tropical Medicine” at the University of Bremen, Germany, 23 June to 1 July 2022. She spoke on the topics “Why we need to count and classify mosquitoes” and “Monitoring school absenteeism to enhance disease surveillance”
- Asst. Prof. Thundon Ngamprasertchai presented “The prototype electronic vaccination registry study: turning clinical data into favorable platform” at the Mahidol Oxford Translational Innovation Partnership (MOTIP) Networking Conference on 7 - 9 November 2022 at Chao Phaya River Cruise Dinner, Manohra Cruises@Anantara Riverside Bangkok Resort.
- The Department of Social and Environmental Medicine co-hosted the “7th Indian International Conference on Air Quality Management IICAQM 2022 “Measurement, Modeling, Health Risk and Public Policy” (29 November-1 December 2022) at the Indian Institute of Technology in Madras, Chennai.

- The Department of Social and Environmental Medicine organized the international training program “Environmental Chemicals and Human Health” in collaboration with Hokkaido University (Japan) and Seoul National University (South Korea). Fifty participants attended from 11 countries. Students from three universities were working together both online and in person at the Faculty of Tropical Medicine. They presented their group work in

different aspects and topography. They had an excellent opportunity to learn more about Thai culture and life style.

- DRUM organized international workshops entitled “Mahidol University – University of Washington Malaria Research Initiative” to share outcomes of collaborative malaria research between Mahidol University and University of Washington in Seattle, USA.

20TH INTERNATIONAL CONGRESS FOR TROPICAL MEDICINE AND MALARIA (ICTMM 2020)

Many researchers from the Faculty attended and presented at ICTMM 2020, held 24-28 October 2022 in Bangkok, Thailand. The event is one of the largest tropical-medicine conferences in the world.

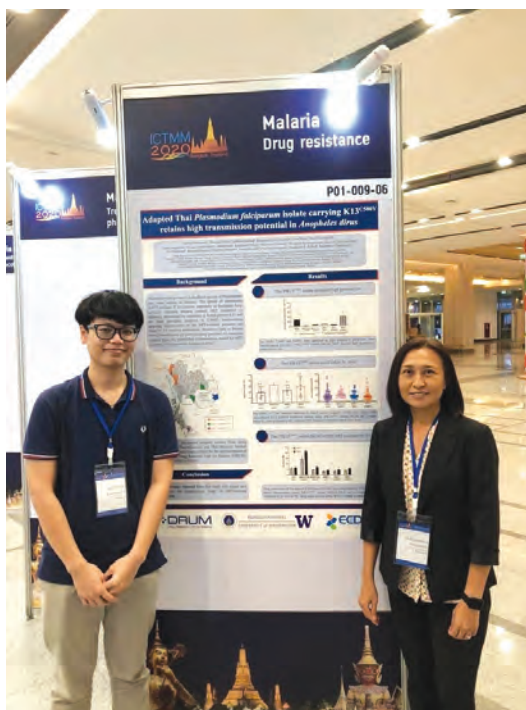
Prof. Narisara Chantratita and Prof. Mallika Imwong presented as invited speakers for sessions on melioidosis and malaria, respectively.

Prof. Emer. Punnee Pitisuttithum was invited to present her topic entitled “Update and challenges of HIV vaccine candidates in clinical trials”.

Assoc. Prof. Urusa Thaenkham presented her study “Awareness of strongyloidiasis in *Strongyloides stercoralis* and *Strongyloides fuelleborni* in reservoir hosts as a concerning issue in Southeast Asia through molecular epidemiology”.

Assoc. Prof. Saengduen Moonsom shared her study “Production of pathogenic and intermediate *Leptospira* specific monoclonal antibodies and their future applications” in the oral sessions.

Head of the Drug Research Unit for Malaria (DRUM), Dr. Rapatbhorn Patrapuvich, presented her research “Selection parameters facilitating *Plasmodium falciparum* evolution”.



Tachin Khulmanee presented his research project at ICTMM2020

A number of researchers from various Departments and Units in the Faculty presented their posters at ICTMM 2020.

Poster presenter	Department/Unit	Title
Charit Srisook	Tropical Pathology	Investigating aquaporin-1 in choroid plexus of post mortem cerebral malaria patients
Kanthinich Thima	Protozoology	Identification of malaria transmission blocking agents from Thai natural products
Pichamon Sittikul	Tropical Pediatrics	Use of Zika NS1 ELISA to evaluate Zika virus infection in Ratchaburi Cohort Study
Pongruj Rattaprasert	Protozoology	Molecular detection of <i>Entamoeba dispar</i> from water samples in Thailand
Sirasate Bantuchai	Mahidol Vivax Research Unit	Genetic variation of pkMSP-1 among <i>P. knowlesi</i> isolates from south and central regions, Thailand
Supattra Glaharn	Tropical Pathology	Malaria serum-induced alteration of actin in endothelial cells
Supawat Chatchen	Tropical Pediatrics	A 1-year zika serosurvey study in Amphawa District, Samut Songkhram Province, Thailand
Tachin Khulmanee	Drug Research Unit for Malaria	Adapted Thai <i>Plasmodium falciparum</i> isolate carrying K13C580Y retains high transmission potential in <i>Anopheles dirus</i>
Tapanee Kanjanapruthipong	Tropical Pathology	Pulmonary epithelium infected with <i>Aspergillus fumigatus</i> induces cytoskeletal alteration in early cellular response rather than <i>Scedosporium apiospermum</i>
Urai Chaisri	Tropical Pathology	The nanoworld of the malaria parasite
Wilanee Dechkhajorn	Tropical Pathology	Expression of B cell receptors related to the BAFF/APRIL system in spleen of fatal <i>Plasmodium falciparum</i> malaria patients
Yaowapa Maneerat	Tropical Pathology	Excretory-secretory products from third-stage <i>Gnathostoma spinigerum</i> larvae involves immune evasion strategies in human gnathostomiasis

PARTNERSHIPS AND COLLABORATIONS



Prof. Nicholas Day
Director

MAHIDOL OXFORD TROPICAL MEDICINE RESEARCH UNIT (MORU)

Over the past two years, MORU Network staff have authored or co-authored >700 scientific publications. Below are some salient examples of MORU activities in 2021-2022:

STUDIES ON THE PREVENTION AND TREATMENT OF COVID-19

In early 2020, much of our research effort pivoted to research on the COVID-19 pandemic. In 2022, we completed the multinational COPCOV clinical trial, which investigated the role of chloroquine/hydroxychloroquine in COVID-19 prevention. 4,652 volunteers were randomised and received either the active drug or placebo for 3 months, with the primary outcome being symptomatic COVID-19. Following on from COPCOV, we initiated the PLATCOV COVID-19 treatment platform trial, designed to assess the pharmacodynamic effects

of putative antivirals and monoclonal antibodies in early symptomatic COVID-19 disease. This study has now recruited over 1,000 patients, and the first paper (on ivermectin) has been published, showing that ivermectin has no measurable antiviral effect in early symptomatic COVID. Both of these studies represent close collaborations with colleagues at the Faculty of Tropical Medicine, and the Faculty's Hospital for Tropical Diseases was a major recruitment site.



Members of the Clinical Therapeutics Unit (CTU) at a patient's bedside in a ward at the Hospital for Tropical Diseases. © MORU 2023. Photographer: Gerhard Jørén.

We also developed and validated prediction scores of progression of moderately severe COVID-19 disease, for use in resource-limited settings where it is important to identify which patients will benefit from hospitalisation and additional clinical therapy. Our ICU network across South and Southeast Asia produced standardised data on severe COVID-19 clinical features and progress, and was also able to randomise severe COVID-19 patients into several treatment arms of the REMAP-CAP international platform.

STUDIES ON ANTIMICROBIAL DRUG RESISTANCE

Antimalarial and antibiotic drug resistance has been a major research theme for the MORU Network over the past 2 years.

a. Antimalarial drug resistance

Working closely with the Faculty of Tropical Medicine we continued our decade's long research programme on antimalarial drug resistance and investigating the genetic epidemiology of malaria as a tool to understand and track this. In 2022, using this approach, we were able to identify a selective sweep for *Plasmodium falciparum*

kelch13 R539T mutants as the cause of a malaria outbreak in Lao PDR.

One promising means to prevent and treat multi-drug resistant malaria is the deployment of triple artemisinin combination therapies (TACTs). MORU has been leading the trialling of these across Asia and Africa. For example one randomised controlled trial in Cambodia and Vietnam showed that artemether-lumefantrine-amodiaquine is safe and effective in the Western Greater Mekong Subregion, where multi-drug resistant falciparum malaria is common.

b. Antibiotic drug resistance

MORU Microbiology, led by Prof Direk Limmathurotsakul, has conducted a number of studies on AMR, including on the burden of AMR in Thailand. In one study demonstrating for example that the population attributable fraction (PAF) of mortality caused by AMR infections in Sunpasitthiprasong Hospital in Ubon Ratchathani compared to antimicrobial-susceptible (AMS) was 16.3%. They have also introduced the concept of 'Antibiotic Footprint' to raise awareness of the problem of excessive antibiotic usage, a driver of the development of resistance.



Prof. Phaik Yeong Cheah (centre) and Bhensri Naemiratch of the MORU Bioethics & Engagement team participate in a group discussion with a World Animal Protection (WAP) delegate (right) as part of the 2022 Wellcome funded "AMR Dialogues" regional conversation for central region of Thailand. © MORU 2023.

PREVENTION AND MANAGEMENT OF RURAL FEBRILE ILLNESS AND NEGLECTED TROPICAL DISEASES

Malaria remains a common rural febrile illness in the region, if not in Thailand itself. A randomised clinical trial of chemoprophylaxis in forest going workers (a high risk group) in Cambodia showed that artemether-lumefantrine as prophylaxis was acceptable and well tolerated and substantially reduced the risk of malaria. MOCRU, our research unit in Myanmar conducted a cluster randomised trial of dihydroartemisinin-piperaquine mass drug administration (MDA) in Kayin State, a region with artemisinin resistance in Myanmar. This trial showed that the substantial reduction in *P. falciparum* prevalence resulting from support of community case management was significantly accelerated by MDA.

For patients with febrile illnesses and suspected sepsis reaching hospital, the qSOFA score is now a common way of assessing the prognosis of patients and helping predict the need for critical care. A MORU/FTM study conducted in Thailand

showed that the predictive utility of the qSOFA score can be substantially enhanced by adding point-of-care blood lactate measurement.

Rickettsial infections, in particular scrub typhus, are a common but underdiagnosed and understudied cause of febrile illness in Asia. Public awareness of these diseases is low, and MORU has conducted intensive public engagement activities amongst Hill Tribe villagers and healthcare workers in Chiang Rai Province. An FTM/MORU sero-epidemiological study in Nan Province, Thailand, identified environmental and socio-economic risk factors for exposure to rickettsial infections. Once infected with *Orientia tsutsugamushi*, the cause of scrub typhus, patients may progress to severe and fatal disease. To determine the optimal treatment of these patients MORU conducted, with Christian Medical College in Vellore and collaborators in six other sites across India, the first ever randomised controlled trial on the treatment of severe scrub typhus. Intravenous doxycycline was compared with intravenous azithromycin and with a combination of the two. The combination treatment of two antibiotics was associated with superior clinical outcome to either of the two monotherapies.



South and Southeast Asia Community Trials Network (SEACTN) team members visit Chiangrai Clinical Research Unit (CCRU) in March 2022. Led by PI Prof Yoel Lubell, SEACTN aims to find out the causes of febrile illness in rural South and Southeast Asia. © MORU



Dr. James Tibenderana
Chief Executive

MALARIA CONSORTIUM

The Malaria Consortium was an early-learner during the COVID-19 pandemic, and quickly adapted to produce a series of online vector-surveillance tutorials and also APMEN TechTalk webinars that have proven to be popular and successful. They are therefore continuing with these online productions because they cost little and can be attended by anyone anywhere in the world.

- Despite the cost-effectiveness of online courses, some things just have to be done face-to-face, and it was with relief that in mid-2022, Malaria Consortium was able to resume their annual intensive two-week Malaria Vector Surveillance for Elimination (MVSE) courses. Their fourth such course was held in Udaipur, India, during July 2022, with 20 participants competitively selected from across South Asia.
- In collaboration with our colleagues in the Department of Medical Entomology, Malaria Consortium organized a South-South Exchange Visit in November 2022, bringing ten senior representatives from the Ministries of Health and research institutions of five African countries to Thailand for capacity strengthening in arbovirus preparedness. These African colleagues spent a week



A participant of MVSE demonstrating morning resting collection to capture adult mosquitoes.

with the Malaria Consortium, Armed Forces Research Institute for Medical Sciences, the Department of Medical Entomology, and the Vector-Borne Disease Control agency of the Ministry of Public Health.



Representatives and participants of the South-South Exchange Visit

- The Malaria Consortium was an active contributor to the ICTMM and JITMM conferences organized by Mahidol University. Malaria Consortium held one Symposium during each of the two events, with international speakers from Africa, Europe and Asia.



Dr. Joseph Woodring
 Head

CLINIC AT TROPMED (SCC)

In February 2023, the SCC successfully completed the Zolifodacin study, which is a first-in-class, Phase III global study for the treatment of uncomplicated urethral gonorrhoea. SCC has completed the follow up visits for all 61 enrolled participants. Among 15 investigative sites globally, SCC was selected as one of 5 sites to join the pharmacokinetics (PK) sub-study. SCC also successfully recruited 6 participants into this sub-study who were admitted overnight to the Hospital for Tropical Diseases.

- SCC's HPTN 083 Study Team was awarded the CDC Director's Award for Excellence in Public Health Impact "For high impact contributions and superior performance showing safety, efficacy and superiority of Cabotegravir-Long Acting for preventing HIV" in August 2021.
- The emergence of *N. gonorrhoeae* (NG) antimicrobial resistance (AMR) is a global public-health concern as cephalosporins are the last remaining treatment option. Worldwide, NG AMR has occurred episodically and most believe the emergence of these strains is likely to have first occurred in Southeast Asia. SCC continued its successful partnership

with Thailand MOPH's Bangrak Hospital STI Clinic on implementing the Enhanced Gonococcal Antimicrobial Surveillance Programme (EGASP), which detects AMR NG stains and serves as an early warning system for strains of concern. The EGASP surveillance data is of the highest quality, with accuracy and completeness ranging from 98.6% to 99.6% and 95.0% to 99.9%, respectively. The assessment of the EGASP data conducted in the year 2022 showed 100% validity. In 2022, the EGASP team received prestigious awards from the U.S. Embassy, as well as recognitions from WHO and the CDC for their EGASP work.



SCC members with Dr. Rochelle Walensky, Director of US-CDC (top, middle) at the Silom Community Clinic headquarters in Bangkok, Thailand.



Assoc. Prof. Dr. Pratap Singhasivanon
Secretary General/ Coordinator

SOUTHEAST ASIAN MINISTERS OF EDUCATION (SEAMEO) TROPICAL MEDICINE AND PUBLIC HEALTH (TROPMED) NETWORK

Promoting One Health Education in a Thai Border School

The implementation of the “One Health” concept is becoming more and more relevant given current developments in emerging and re-emerging diseases, population growth and ecological changes. The “One Health” approach recognizes that the health of people is closely linked to the health of domesticated and wild animals and that of our shared environment. The principle behind the “One Health” concept is consistent with a number of Sustainable Development Goals (SDG).

Promotion of the “One Health” concept should not only be limited to human health, animal health and environmental health professionals. Understanding of the interdependence of these three will facilitate development of promotive and preventative behavior of everyone. Children usually associate closely with animals, thus there’s a need for preventive education against zoonoses. In addition, the school plays a key role in the development of positive attitude and behaviors that can help them in making decisions later in life. In addition, students can bring these concepts to home and to the greater community.

SEAMEO TROPMED Network in collaboration with CHEVRON and Southeast Asia One Health University Network (SEAOHUN) is implementing this project in Rujiraphat School in Thanao Si Sub-district of Suan Phueng district in Ratchaburi Province, a mountainous area of 1,005 square kilometers. The school has about 1,200 students enrolled from Kindergarten 2-3 and Grades 1-9.

Objectives

- Develop competencies of teachers on the promotion of concepts of “One Health”;
- Promote the development of positive attitudes and behaviors related to “One Health” among students through curricular intervention; and

- Collaborate with the different groups in the community for the promotion of “One Health” concepts.

Components/Activities

1. Curricular integration of One Health (OH) related concepts in the basic education curriculum

The following activities were undertaken in relation to curricular mainstreaming

- 1.1 Development of Modules for Teachers on One Health and OH related topics.
- 1.2 Four modules were developed for different Grade levels (Kindergarten 2-3; Grades 1-3; Grade 4-6; Grades 7-9). Each module has 6 topics (One Health concepts; Handwashing; Pets; rabies; Malaria; Worms)
- 1.3 Training of Teachers in One Health
A 2-day training seminar of all teachers was organized to provide teachers basic knowledge of One Health.
- 1.4 Training of Teachers on the Use of the Modules
Teachers teaching Science and Health subjects were the first batch of teachers trained on the use of the modules. A second batch of teachers handling different subjects will be trained in May 2023.



2. Health Assessment of Students

Health assessment activities were undertaken to serve as learning opportunities for the students in addition to providing health services. The following activities were undertaken:

- 2.1 Orientation of teachers
- 2.2 Distribution of consent forms to be signed by parents/guardians
- 2.3 Physical examination
- 2.4 Stool examination
- 2.5 Hemoglobin level determination
- 2.6 Treatment of those found positive for soil-transmitted helminths



3. Water-source testing

Water sources for both drinking and domestic use were collected and brought to the Ministry of Public Health for examination.



4. Monitoring and Evaluation

4.1 Pre- and Post-tests of Students

Pre- and post-tests of Grade 3-9 students were undertaken to measure learning gained after the mainstreaming of the 6 topics.

4.2 Observation of a number of classes during the mainstreaming activities

4.3 Feedback Workshop with teachers

A workshop was organized to gather feedback from the teachers after they had implemented the integration of the 6 topics in their classes. The teachers were

requested to respond to an Individual questionnaire. In addition, small group discussions were organized to gather group perceptions about the experiences, enabling factors and challenges met during the implementation of curricular integration.



Dr. Mehul Dhorda
Head

WORLDWIDE ANTIMALARIAL RESISTANCE NETWORK (WWARN)

A WWARN meta-analysis commissioned by the World Health Organization (WHO) which informed a change to its treatment guidelines for treatment of uncomplicated malaria in the first trimester of pregnancy was published in *The Lancet*. The study provides compelling evidence that artemether-lumefantrine should now replace quinine as the treatment of choice in the first trimester.



Credit Arne Hoel, World Bank.

- WWARN highlighted the need for more rapid dissemination of molecular marker data to monitor artemisinin resistance. The paper entitled “Mapping genetic markers of artemisinin resistance in *Plasmodium falciparum* malaria in Asia: a systematic review and spatiotemporal analysis”, was published in the *Lancet Microbe*. The authors suggested that more consistent data collection, over more extended periods in the same areas with the rapid sharing of data are needed to map the spread and evolution of resistance to better inform policy decisions. Data in the literature are reported in a heterogeneous way, leading to difficulties in pooling and interpretation.
- A research study from the Infectious Diseases Data Observatory (IDDO), a collaborator of WWARN, published in *PLOS Global Public Health* discovered that heterogeneity of COVID-19 disease severity criteria and incomplete reporting compromise meta-analysis. To address this issue, the researchers recommend using individual patient data (IPD) to guide and improve therapeutic recommendations for COVID-19.
- WWARN conducted a field evaluation of EasyScan GO: a digital malaria microscopy device. Microscopic examination of Giemsa-stained blood films is key to quantifying and detecting malaria parasites but there can be difficulties in ensuring both a high-quality manual reading and inter-reader reliability. The EasyScan GO was developed as a potential solution to this, a microscopy device using machine-learning-based image analysis for automated parasite detection and quantification. The EasyScan GO met the WHO-TDR Research Malaria Microscopy competence Level 2 criteria in parasite detection and species identification accuracy; and Level 4 in terms of parasite quantification and false positive rates. All performance parameters were significantly affected by slide quality. Further software improvement is required to improve sensitivity at low parasitaemia and parasite density estimations.



Credit Joss Dimock, Wellcome Images.

EDUCATION



Asst. Prof. Dr. Wirongrong Chierakul
Deputy Dean for Education and
Quality Development



Assoc. Prof. Wirichada Pan-ngum
Deputy Dean for Education and
Quality Development



BANGKOK SCHOOL OF TROPICAL MEDICINE (BSTM)

Throughout the COVID-19 pandemic, the Bangkok School of Tropical Medicine (BSTM) continued to provide robust support and a quality education for its students.

The BSTM provided various internal and external scholarships for both Thai and international students. Many of the students admitted in 2021 and 2022 received scholarships to support their studies and research.

Several students were able to go abroad under the outbound program supported by Mahidol University and other research scholarships.

During the pandemic, the BSTM developed its online learning platform to continue teaching and maintain its connection with students. TM-Online.org offers 150 online courses designed and delivered by experts from the Faculty.

Moreover, the BSTM trained its lecturers and support staff in the use of modern technologies for teaching and communication, skills that they can continue to practice and update. Hence, in future unexpected situations, the BSTM will be better equipped and prepared, with the adaptive capacity to minimize disruptions to its programs.



BANGKOK SCHOOL OF TROPICAL MEDICINE IS INVITING YOU TO

ACADEMIC FORUM 2022

March 31, 2022
9:00 - 12:00 hr

Online SCHEDULED ZOOM MEETING JOIN THE CONVERSATION

On-site 5th FLOOR CHALOEM PHRAKIAT BUILDING FACULTY OF TROPICAL MEDICINE

Registration form

BSTM teaching and support staff have developed high levels of competence in the use of online teaching tools. Student Affairs also adapted, to continue organizing student activities, ensuring that students are supported and are able to develop soft skills, including communication, teamwork, leadership, and others. Some innovations, such as the virtual Wai Khru Ceremony, Academic Forum, and e-Sports Day, were created for the first time in the Faculty.

While the pandemic has brought many challenges to the School and academia in general, it has also created opportunities for online learning. The School's fully online program in Biomedical and Health Informatics (BHI), which has been running before the pandemic, attracted increased interest from students wishing to continue their studies while abroad, working full-time, and/or during the pandemic when physical classes were unavailable. The number of BHI students increased in both 2021 and 2022.

มหาวิทยาลัยมหิดล Mahidol University

HOME INSTRUCTOR DEGREE PROGRAMS COURSES PUBLICATION CONTACT US

<p>INTRODUCTION TO PROGRAMMING</p> <p>Winichada Pan-Ngum</p> <p>Introduction to R</p> <p>11 73</p>	<p>แบบจำลองเชิงคณิตศาสตร์กับการควบคุมการระบาดของโรค</p> <p>Winichada Pan-Ngum</p> <p>Mathematical modelling of infectious disease</p> <p>31 83</p>	<p>Short Training Course Data Management (Online)</p> <p>Saranath</p> <p>Data Management (Course)</p> <p>52 65</p>	<p>TMHG523 Principles and Foundations of Public Health Informatics</p> <p>Saranath</p> <p>Principles and Foundations of Public Health Informatics</p> <p>68 57</p>
<p>TMHG528 Disease Surveillance and Public Health Investigation</p> <p>Lokachei Tanasugarn</p> <p>Disease Surveillance and Public Health Investigation</p> <p>35 60</p>	<p>TMHG544 Challenging Issues In Health Informatics</p> <p>Winichada Pan-Ngum</p> <p>Challenging Issues In Health Informatics</p> <p>27 54</p>	<p>TMHG545 Information System Design and Implementation in Health Care</p> <p>Pongthep Miankuew</p> <p>Information System Design and Implementation in Health Care</p> <p>25 53</p>	<p>BHI Online ORIENTATION</p> <p>Saranath</p> <p>Orientation</p> <p>18 53</p>

The BHI course emphasizes expanding knowledge for people wishing to develop skills in data analytics, information technology (IT), and healthcare, for example, maximizing the use of health data in research for better health outcomes. In addition, many courses at the BSTM are now available via the Mahidol Apprenticeship Program Curriculum (MAP-C), where the general public and students can study the program and transfer credit to Mahidol University's post-graduate programs in the future.

As the COVID-19 situation continued to improve in 2022, physical classes and events gradually returned to the School's activities. Among these events was "TROPMED Cultural Day – National Delegation", which aimed to foster camaraderie among students and learn about each other's cultures. The event also encouraged students to develop soft skills and establish positive relationships among Thai and foreign students.

Looking forward

The BSTM is looking forward to welcoming our new students who will be arriving in August 2023. The School is currently under renovation and will have two modernized floors, new lecture rooms, and co-working spaces.



HEALTH



Telemedicine



Assoc. Prof. Watcharapong Piyaphanee
Director



Asst. Prof. Sant Muangnoicharoen
Deputy Director

HOSPITAL FOR TROPICAL DISEASES

The Hospital for Tropical Diseases has continuously adapted during the COVID-19 outbreak. To reduce the risk of COVID-19 transmission, the Hospital opened an acute respiratory infection clinic outside its building to serve as a one-stop service for the community. The services include registration, history taking, physical exam, swab testing for COVID-19, payment to cashier, and home medication without the need to enter the hospital building.

As part of the Hospital's COVID-19 efforts, a new cohort ward and ICU bed dedicated to COVID-19 patients, were built. There are now 33 beds and 3 ICU equipped with negative pressure system. Since the start of the pandemic, the hospital has admitted and treated a total of 3,307 COVID-19 patients. In addition, the hospital cooperates with Phayathai District office to set up community isolation (CI) to help local community look after mild COVID-19 cases. The Hospital also provided COVID-19 vaccinations for the public, including students from the University of the Thai Chamber of Commerce and Rajamangala University of Technology Phra Nakhon. To date, the Hospital has provided a total of 49,658 COVID-19 vaccine doses.



HAPYBOT

The Hospital transformed many services for the 'new normal', including access to online medical records, website and information for public relations, an online appointments system, telemedicine, online payment system, and many more. With support from external agencies, the Hospital obtained new innovative technologies that are used to assist medical personnel while taking care of COVID-19 patients. These are the HAPYBOT, an intelligent mobile medical robot, and Kaitomm, a telecommunications system that allows touch-less video communication between medical personnel and patients.



Kaitomm

In addition, IoT devices were developed and used to monitor temperature, humidity and water leaks within various hospital units. The Hospital has been improved in many respects, to ensure safe, reliable and speedy services, reducing exposure to infectious agents, the spread of infection, resource wastage, travel time, etc.



Recently, the Hospital launched a mobile application called "HTD connect" to facilitate access by service users, who can check the doctors' schedules, make an online appointment, view treatment history, medication history, laboratory results, and COVID-19 vaccination history. The application is also connected to the payment system, which can show the total service costs, which can then be paid via mobile phone QR Code. In the near future, the Hospital aims to acquire a digitized hospital information system and provide free Wi-Fi for visitors and patients.

The Hospital for Tropical Diseases received its 3rd reaccreditation from the Health Care Accreditation Institute of Thailand. This significant achievement affirms that the Hospital ensures the highest standards of patient care and continuous quality improvement. The Hospital for Tropical Diseases is looking forward to a great year ahead.

2021 - 2022

3,307

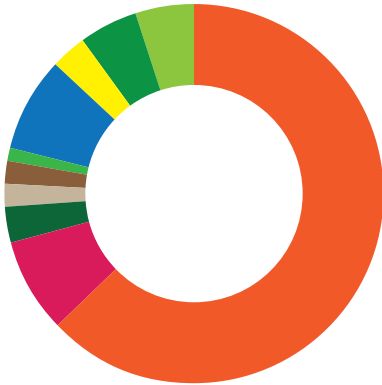
COVID-19 patients treated

49,658

COVID-19 vaccine doses

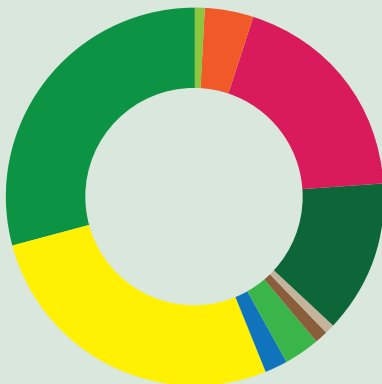
19,644

COVID-19 tests



Inpatient Case

COVID-19	63%
Dengue	8%
Diarrhea	3%
Fever (unknown cause)	2%
Heart disease	2%
Malaria	1%
Pneumonia	8%
Sepsis	3%
Urinary tract infection	5%
Chronic renal failure	5%



Outpatient Cases

COVID-19	4%
Dermatitis	19%
Diabetes	13%
Diarrhea	1%
Fever (unknown cause)	1%
Heart disease	3%
Hepatitis	2%
High blood pressure	27%
High cholesterol	29%
HIV	1%

FACILITIES

CENTRAL EQUIPMENT UNIT

The Central Equipment Unit (CEU) provides 48 different types of research equipment, with over 100 items and tools. The Unit received 3,800 visits from researchers, and generated over 3,000 liters of Type III, 1,325 liters of Type II, and 4,245 liters of Type I, laboratory purified water.

In 2022, 6 equipment training and workshop events were held for students and staff on the proficient and responsible use of the equipment. The training goal was to introduce a standardized procedure and instill the principle that 'users are owners', so that users should take the utmost care with equipment. New scientific techniques and technologies are included in the Unit training theme to inspire other scientific additions which can make a wider range of techniques accessible to researchers and help advance tropical-disease research.

The Central Equipment unit co-hosted the Wellcome Global Training Course: Antimicrobial Resistance (AMR) in Bacterial Pathogens – Asia, and laboratory activities were conducted in the Unit.



Laboratory activities of the AMR course were conducted in the CEU

Two new pieces of high-throughput equipment were installed in 2022, a flow cytometer analyzer with 4 lasers and 19 parameters, and a flow cytometer cell sorter with 1 laser and 4 parameters. This equipment greatly enhances the efficiency of scientific research, especially research into emerging and re-emerging tropical diseases.



A new high-throughput acquisition; flow cytometer analyzer; 8th floor, Rajanagarindra Building

LABORATORY ANIMAL SCIENCE UNIT



The Laboratory Animal Science Unit of the Faculty of Tropical Medicine (FTM-LAU) provides animal facilities and services for the research projects of faculty members and to other institutions for research, testing and teaching.

In 2022, FTM-LAU serviced a total of 29 research projects from 10 TropMed departments, units, and researchers, the Faculty of Dentistry, Mahidol University, and Chulalongkorn University. The Unit supported technical services by trained veterinary technicians in 10 research projects, e.g., animal restraint, blood and organ collection, euthanasia and necropsy.

FTM-LAU provided an online and onsite training course entitled “Writing an Animal Protocol”, attended by 44 Faculty participants. The course aimed to describe the types of FTM-animal protocol formats and how to write a detailed outline of the proposed animal care used in research.

FTM-LAU will continue to improve the quality of animal facilities, services, and develop standard operating procedures (SOPs) for effective services, to promote the welfare of laboratory animals and support the Faculty’s research.



“Writing an Animal Protocol” Training Course

TROPICAL MEDICINE DIAGNOSTIC REFERENCE LABORATORY

The laboratory is accredited as compliant with ISO 15189: 2012 (Medical laboratories-requirements for quality) and ISO 15190: 2003 (Medical laboratories-requirements for safety) as requirements of the Bureau of Laboratory Quality Standards for the following tests:

- Detection of dengue virus infection by real-time RT-PCR
- Detection of IgM and IgG antibody to dengue virus infection by ELISA
- Detection of parasite infection by direct wet smear technique and stool concentration technique
- Detection of Zika virus infection by real-time RT-PCR
- Detection of Chikungunya virus infection by real-time RT-PCR

The laboratory has also been accredited as compliant with the network laboratories of the Department of Medical Sciences, Ministry of Public Health, for the detection of SARS-CoV-2 infection and Monkeypox virus infection by real-time RT-PCR.



กรมวิทยาศาสตร์การแพทย์
ออกใบรับรองฉบับนี้ให้ไว้ เพื่อแสดงว่า

คณะเวชศาสตร์เขตร้อน มหาวิทยาลัยมหิดล

ได้ผ่านการรับรองความสามารถห้องปฏิบัติการเครือข่ายตรวจ SARS-CoV-2
ด้วยวิธี Real-time RT-PCR
(Individual Nasopharyngeal and Throat Swab Sample)
(Pooled Saliva Samples)
(Pooled Nasopharyngeal and Throat Swab Samples)


(นายศุภกิจ ศิริลักษณ์)
อธิบดีกรมวิทยาศาสตร์การแพทย์

ให้ไว้ ณ วันที่ 9 มีนาคม 2565
ถึงวันที่ 8 มีนาคม 2566

เลขทะเบียน สมป. 63/1028
(ต่ออายุครั้งที่ 2)

JOINT INTERNATIONAL TROPICAL MEDICINE MEETING (JITMM)



The Joint International Tropical Medicine Meeting (JITMM), hosted by the Faculty of Tropical Medicine, Mahidol University, was held virtually on 15-17 December 2021 and as a hybrid conference on 7-9 December 2022.

JITMM Virtual 2021 hosted 738 participants from 36 countries. In 2022, JITMM was held in a hybrid platform for the first time, attracting 777 participants from 39 countries. It was held at the Montien Hotel Surawong Bangkok, Thailand, where 452 participants attended onsite, while 115 attended online and 210 participated both online and onsite.

With the theme “Tropical Medicine in the New Now Normal”, JITMM Virtual discussed the latest updates and important issues in tropical medicine and the COVID-19 pandemic. Leading experts in the field of tropical medicine & malaria and public health authorities presented at the virtual meeting. Prof. Sir Jeremy Farrar and Prof. Banchong Mahaisavariya were Keynote Speakers.





The JITMM 2022 Hybrid's theme was "Leveraging the Pandemic Experience: Our Tropical Medicine Community Rejuvenated". It highlighted the activities, discoveries, lessons-learned, and opportunities related to the pandemic. World-renowned luminaries in global health and emerging-disease threats, such as Dr. Dennis Carroll, presented the Opening Keynote Address onsite. Prof. Drew Weissman, who is best known for his contributions to RNA biology, which enabled the development of effective mRNA vaccines for COVID-19, presented the Closing Keynote Speech virtually.

In the past two years, JITMM has been held virtually due to the COVID-19 pandemic. In 2022, with increasingly effective COVID vaccination programs worldwide and further easing of travel requirements in Thailand and elsewhere, the Faculty of Tropical Medicine was able to host JITMM as a hybrid conference with the support of co-organizers; Thailand's Ministry of Public Health (MOPH), Chulalongkorn University, Mahidol Oxford Tropical Medicine Research Unit (MORU), SEAMEO TropMed Network, and Hainan Medical University.

HONORS AND AWARDS

- On 2 February 2022, Prof. Mallika Imwong, Head of the Department of Molecular Tropical Medicine and Genetics, received a National Research Award for Fiscal Year 2022, for her research “Elimination of *Plasmodium falciparum* in Thailand”, at Thailand Inventor’s Day 2021 & 2022 Thailand. Thailand Inventor’s Day 2021 & 2022 was organized by the National Research Council (NRC) of Thailand.
- Research. Prof. Jetsumon Prachumsri was included in the Top 1% researchers of Mahidol University in 2021 and 2022.
- Prof. Narisara Chantratita received a Mahidol Research Award in 2021 for her outstanding work on melioidosis.
- Assoc. Prof. Saranath Lawpoolsri Niyom received a Mahidol University Award for teaching excellence in academic year 2021.
- Assoc. Prof. Dr. Jittima Dhitavat received Outstanding Lecturer 2021 awards from the Faculty of Tropical Medicine and Mahidol University Faculty Senate. She was also acknowledged by Mahidol University for her Engagement Strategies for Online Teaching.



- Assoc. Prof. Pongrama Ramasoota received Best Alumni Award 2022, from Kasetsart University Veterinary Association (KUVA), Faculty of Veterinary Medicine, Kasetsart University.
- Ms. Naruemon Wechjakwen won a Best Poster Award at the 15th Thailand Congress of Nutrition (TCN), held in Bangkok, Thailand, 2-3 March 2022, for her presentation entitled “The association of a rare allele frequency of E-selectin gene rs5361 (A>C) polymorphism on dyslipidemia in Thai population”.

- The National Research Council of Thailand (NRCT) awarded Ms. Wilanee Dechkhajorn the 1st Runner-up Award for her work “Tuberculosis naked eye detection kit (MTB Strip)” at the Thailand New Gen Inventors Award 2021, on 2nd - 6th February 2022 (Thailand Inventors' Day 2022) at the Bangkok International Trade & Exhibition Centre (BITEC), Thailand.
- The poster by Mr. Witawat Tunyong, scientist at the Department of Microbiology and Immunology, was voted Most Popular Poster at the Joint International Tropical Medicine Meeting 2022, held in Bangkok, Thailand, on 7-9 December 2022.
- Mr. Kamparnart Keawyai, a scientist at the Department of Tropical Nutrition and Food Science received an Outstanding Presentation Award at the 13th National Science Research Conference, Thaksin University, Phatthalung Campus, Thailand, 12-13 May 2022 for his oral presentation entitled “Study of



analytical method and method validation for simultaneous determination of vitamin A and vitamin E in human serum via high performance liquid chromatography”.

- In 2022, the Tropical Pediatric Diagnostic Center (TDC) laboratory obtained ESPReL laboratory safety certification.

ACADEMIC PROMOTION

During 2021 and 2022, several researchers received academic rank and career promotions.

Name	Academic Promotion	Year
Supitcha Kamolratanakul	Assistant Professor	2021
Sant Muangnoicharoen	Assistant Professor	2021
Wasin Matsee	Assistant Professor	2021
Suchada Sumruayphol	Associate Professor	2021
Yudthana Samung	Researcher, Expert Level	2022
Patchara Sriwichai	Associate Professor	2022
Ronald EM Vargas	Associate Professor	2022
Rutcharin Potiwat	Associate Professor	2022
Raweewan Srisawat	Scientist, Expert Level	2022
Narisara Chantratita	Professor	2022
Wilanee Dechkhajorn	Scientist, Senior Professional Level in Pathology	2022
Thitinan Kitisin	Assistant Professor	2022
Thitiluck Swangsri	Scientist, Senior Professional Level in Molecular Biology	2022
Salin Sirinam	Assistant Professor	2022

*JITMM, the largest tropical-medicine conference in Southeast Asia
will be held as a hybrid conference!*



JOINT INTERNATIONAL TROPICAL MEDICINE MEETING 2023

JITMM Hybrid 2023

**“Achieving the SDGs: Human and AI-driven Solutions
for Tropical Medicine in a Changing World”**

13-15 December 2023

Eastin Grand Hotel Phayathai, Bangkok, Thailand

Hosted by

The Faculty of Tropical Medicine, Mahidol University

Hosted and Organized by

- The Faculty of Tropical Medicine, Mahidol University

Co - Organizers:

- Department of Disease Control, Ministry of Public Health (MOPH)

- Faculty of Medicine Siriraj Hospital, Mahidol University

- Faculty of Medicine, Chulalongkorn University

- Mahidol Oxford Tropical Medicine Research Unit (MORU)

- SEAMEO TropMed Network

IMPORTANT DATES	Opens	Closes
Invited and Sponsored Symposium Proposal Submission	30 June 2023	31 August 2023
Travel Awards Application	15 July 2023	15 August 2023
Abstract Submission and Young Investigator Award Application	15 July 2023	31 August 2023
Early bird Registration	15 July 2023	31 October 2023

*For more information, please visit our website at www.jitmm.com,
or email Secretariat at jitmm@mahidol.ac.th*



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