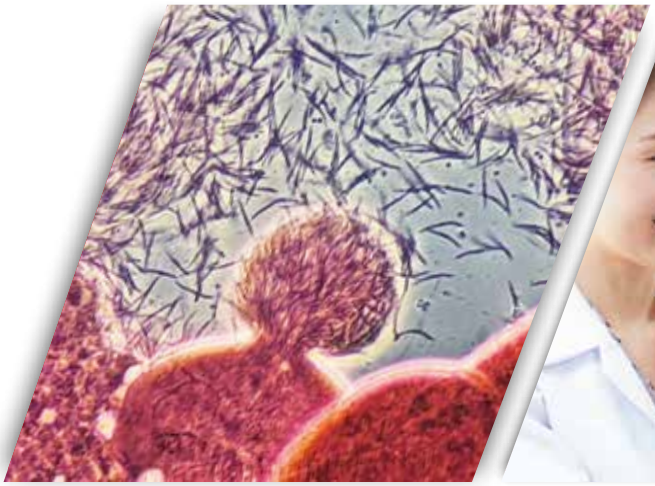
TropMed

ANNUAL REVIEW 2024

Faculty of Tropical Medicine
Mahidol University



THAILAND QUALITY CLASS
TQC 2023

63 Years of TropMed

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DEAN'S FOREWORD

Assoc. Prof. Weerapong Phumratanaprapin, MD
Dean

> In 2023, we celebrated the 63rd Anniversary of the Faculty of Tropical Medicine.

The year 2023 has been a period of significant progress for the Faculty of Tropical Medicine, Mahidol University. We made remarkable achievements in research, education, healthcare services, and management. Our research output remains impactful and we continuously improve our services to keep abreast of the demands of the new normal and ever-changing world.

In this Annual Review, we share the highlights and remarkable successes of the Faculty of Tropical Medicine in 2023.

First, I am delighted to share that the Faculty of Tropical Medicine, Mahidol University has been honored with the Award for Management Excellence (Thailand Quality Class) by the Thailand Quality Award (TQA). The TQA is the national quality award for Performance Excellence in Thailand and has a world-class technical foundation and award process. I am happy that our collaborative efforts and dedication have been recognized with such a prestigious accolade.

In research, we published 408 articles, of which 91% were in Q1 and Q2 journals. Our metrics suggest that each TropMed staff member published an average of 3.8 articles per year. Our research outputs are in the top 10% of the most-cited papers in the field of tropical medicine. Moreover, 65.6% of our publications align with achieving the Sustainable Development Goals (SDGs). This is a testament to the significant global and social impact of TropMed research.

In 2023, six TropMed staff were recognized as Top 1% Researchers by Mahidol University, while many of our current and former TropMed researchers and collaborators were included in the World's Top 2% Scientists by Stanford University.

To further advance our research, we have upgraded our laboratories and ensured that our medical and laboratory safety practices meet national standards. Our Biosafety level 3 laboratory (BSL 3) began operation in 2023. The BSL3 is equipped with high-end tools and technologies that are capable of safely tackling the most virulent and complex viruses and pathogens that can cause serious threats to global health.

In respect of education, our Ph.D. in Tropical Medicine program received an ASEAN University Network Quality Assurance (AUN-QA) level 4.0 certification. This achievement reflects that the quality of the education we provide meets current international standards and best practices in higher education.

In addition, we transformed the Bangkok School of Tropical Medicine's facilities into a modernized and future-proof learning environment. We renovated smart classrooms, developed digital learning platforms, and set up a virtual laboratory and an AV studio to enhance the teaching and learning experience for both instructors and students. In addition, we prioritized student well-being by providing dedicated co-working spaces and a prayer room.

After the COVID-19 pandemic, the Hospital for Tropical Diseases developed services into online platforms, including an appointment system, telemedicine, access to medical records, and a payment system, to name a few. The Hospital launched "HTD connect", a mobile application to access and use all the hospital's online services seamlessly. Various IoT (Internet of Things) devices are being utilized to monitor temperature, humidity, and water leaks in various units of the Hospital.

The Health Care Accreditation Institute of Thailand awarded the Hospital a third reaccreditation, for another 3 years. In addition, the Health Department of Bangkok Metropolitan Authority (BMA) granted the Hospital the Bangkok Clean and Green Award and the Best Innovation Award.

We aim to share our expertise and knowledge with early-career researchers and practitioners through a series of virtual international training courses for the management of malaria. We organized the Joint International Tropical Medicine Meeting (JITMM) as a hybrid conference for the second time. JITMM 2023 attracted around 900 delegates from 34 countries.

Our international collaborations are continuing to grow. Currently, we have 70 active Memoranda of Understanding (MOUs) and Memoranda of Agreement (MOAs) with 68 collaborative partners globally.

In 2023, we celebrated the 63rd Anniversary of the Faculty of Tropical Medicine, Mahidol University. As a member of the Faculty, I am honored to witness our achievements over the years and delighted to be able to contribute to its current and future successes.

As we reflect on our highlights last year, I am proud of the numerous achievements we have accomplished. We clearly have a very bright future ahead of us.

Finally, I would like to thank all our staff and colleagues for their hard work and determination to realize our goal to be a world leader in tropical medicine. I look forward to our continued success!

Towards a thriving and healthy future,

Assoc. Prof. Weerapong Phumratanaprapin, MD
Dean
Faculty of Tropical Medicine, Mahidol University

TROPMED STRATEGIC PLAN 2023-2037

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

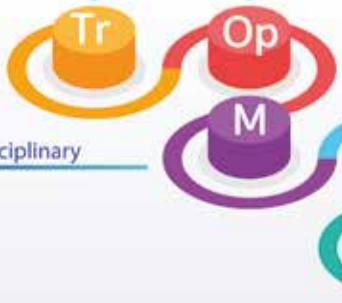
STRATEGIC PLAN 3
Leader in Tropical Health and Academic Services

STRATEGIC PLAN 3
Sustainable Quality Organization

TropMed CORE VALUES

Transformation & Innovation

Open & Globally Connected



Embracing Creativity & Entrepreneurship

Multidisciplinary

Data - Driven Decision

ADMINISTRATIVE BOARD

Assoc. Prof. Weerapong Phumratanaprapin
Dean

Assoc. Prof. Jittima Dhitavat
Deputy Dean for Administration and Strategy

Assoc. Prof. Chukiat Sirivichayakul
Deputy Dean for Finance and Human Resources

Research Prof. Jetsumon Prachumsri
Deputy Dean for Research

Prof. Kesinee Chotivanich
Deputy Dean for International Relations

Assoc. Prof. Kriengsak Limkittikul
Deputy Dean for Education

Assoc. Prof. Pornsawan Leaungwutiwong
Deputy Dean for Research Compliance

Assoc. Prof. Kraichat Tantrakarnapa
Deputy Dean for Facilities and Environment

Asst. Prof. Wirongrong Chierakul
Deputy Dean for Quality Development

Asst. Prof. Teera Kusolsuk
Deputy Dean for Faculty Welfare and Special Affairs

Assoc. Prof. Watcharapong Piyaphanee
Director of the Hospital for Tropical Diseases

Assoc. Prof. Wang Nguitragool
Assistant Dean for Research

Dr. Phimphan Pisutsan
Assistant Dean for International Relations

Mr. Amnat Khamsiriwatchara
Assistant Dean for Information Technology

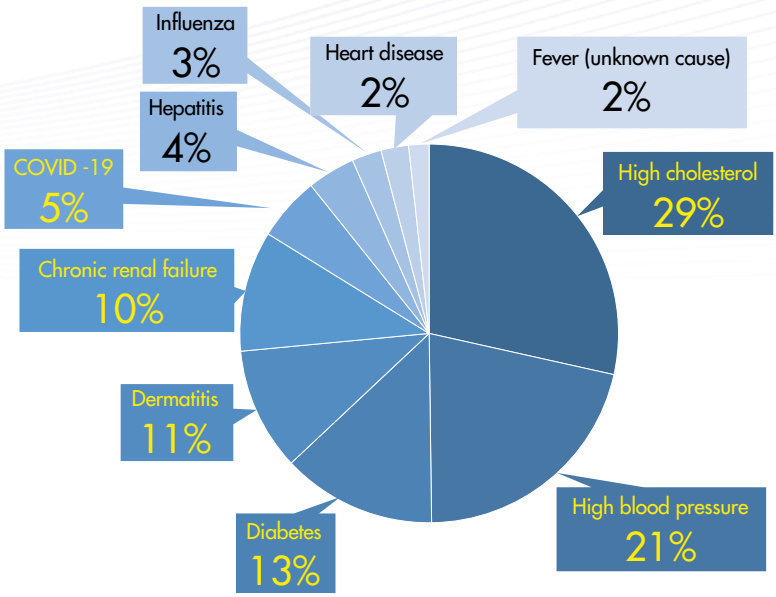
STATISTICAL SUMMARY

RESEARCH

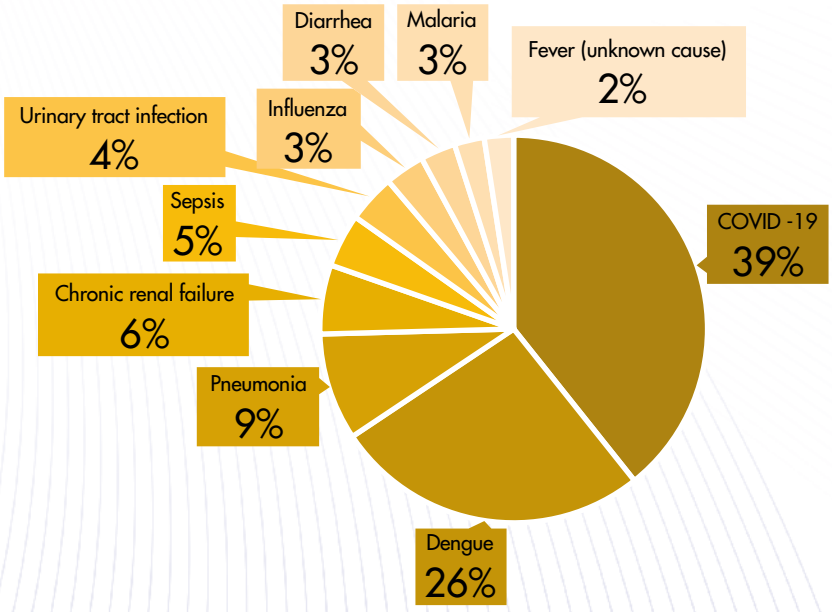
3.8
Publications per researcher (2023)

HOSPITAL FOR TROPICAL DISEASES

Outpatient Cases

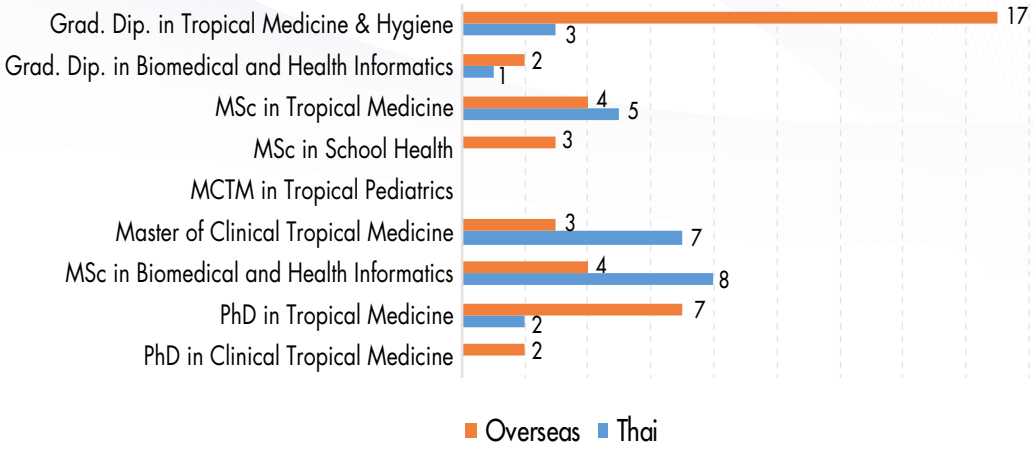


Inpatient Cases

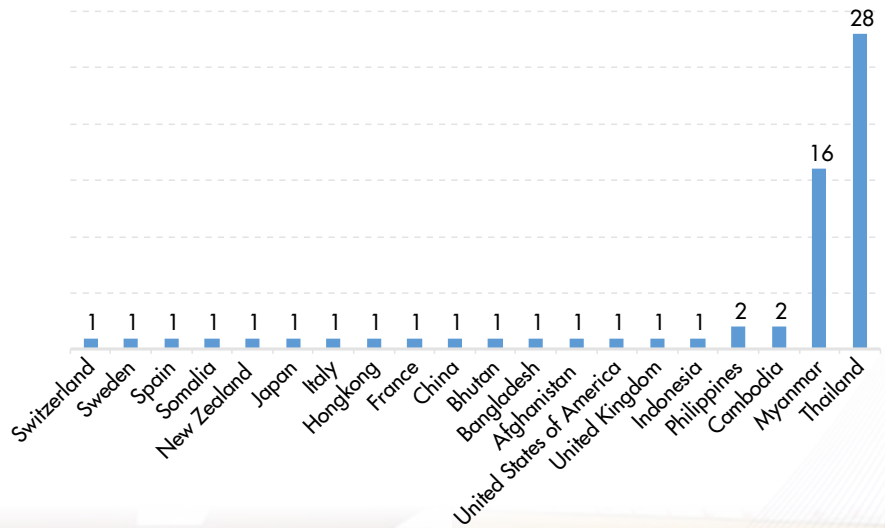


BANGKOK SCHOOL OF TROPICAL MEDICINE

Number of students per international program

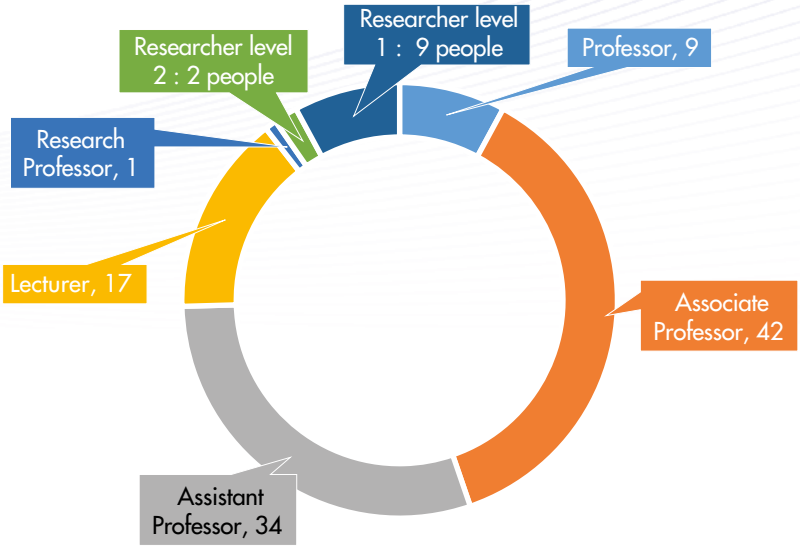


Number of students per Country

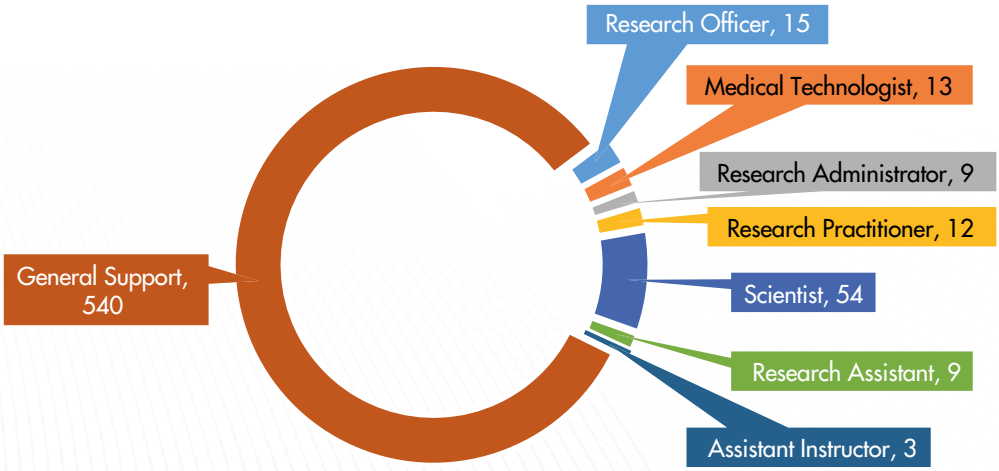


HUMAN RESOURCES

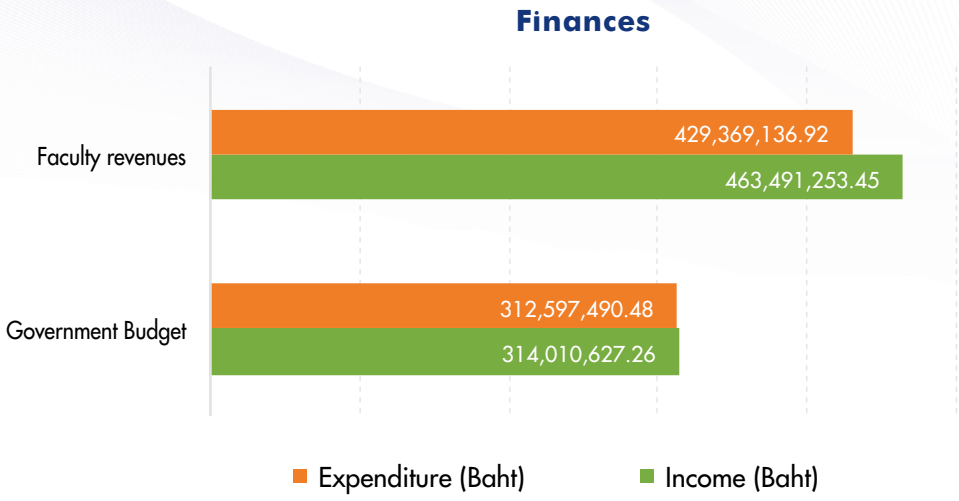
Academic Staff: 114



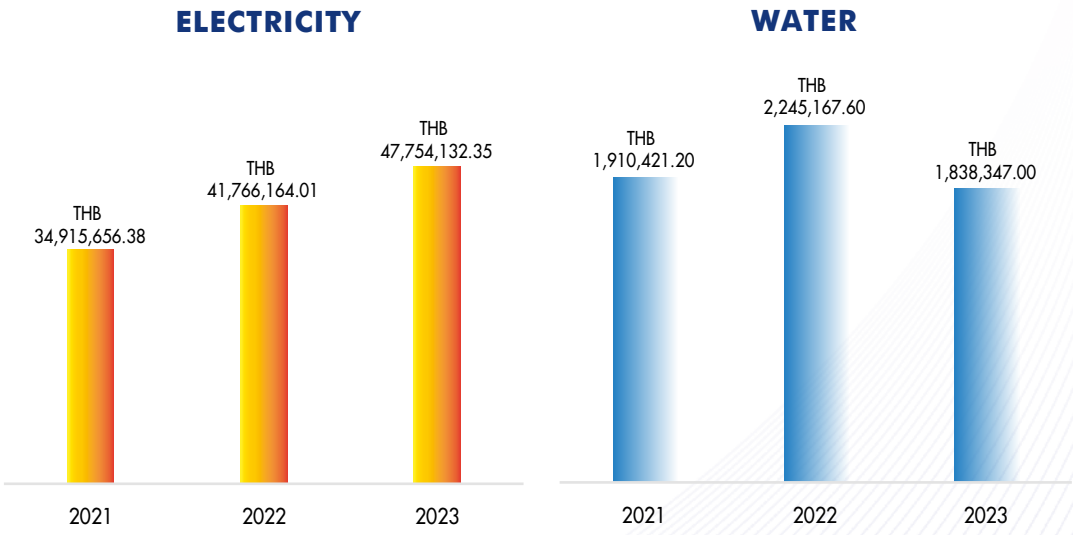
Support Staff: 655



FINANCES



INFRASTRUCTURE AND ENERGY USE



DEPARTMENTS

When the Faculty opened in 1960, there were just five departments, but with increased specialization the number is now eleven, covering a broad range of Tropical Medicine areas. The departments conduct research, teach students from the Bangkok School of Tropical Medicine and provide services to the academic and healthcare communities.

DEPARTMENT OF CLINICAL TROPICAL MEDICINE

Asst. Prof. Udomsak Silachamroon
Head

The Department of Clinical Tropical Medicine excels in addressing the complex medical challenges posed by tropical diseases. Renowned for its pioneering research, innovative treatments, and comprehensive training programs, the Department is at the forefront of combating diseases like malaria, dengue fever, Zika virus, and numerous neglected tropical diseases.

The Department is led by distinguished medical professionals and researchers with multidisciplinary expertise ranging from infectious diseases, epidemiology, microbiology, to immunology. Their collaboration enables the development of cutting-edge diagnostic tools, therapeutic interventions, and preventive strategies tailored to the unique epidemiological landscapes of tropical regions.

Beyond research and clinical care, the Department is also involved in educating the next generation of tropical medicine specialists, equipping them with the skills and knowledge needed to confront the evolving challenges of global health. Through its commitment to excellence, the Department of Clinical Tropical Medicine continues to make significant progress in alleviating the burden of tropical diseases worldwide.

FACTS AND FIGURES 2023

29	12	139	31	9	47	7
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> The Department of Clinical Tropical Medicine excels in addressing the complex medical challenges posed by tropical diseases.

RESEARCH FOCUS

- Epidemiology of malaria, dengue, chikungunya, COVID-19, hepatitis, *Helicobacter pylori*, and *Cryptosporidium*
- Vaccines for malaria, dengue, HIV, chikungunya, COVID-19, UTI, MPOX, and pneumococcal disease
- Artificial intelligence for malaria research
- Diagnosis of malaria, dengue, melioidosis, chikungunya, COVID-19, and type 2 diabetes

Staff of the Department of Clinical Tropical Medicine and Department of Protozoology with students and staff of Juntendo University during the Mahidol University Tropical Medicine Short-term Training.

- Treatments for malaria, COVID-19, hepatitis, *Helicobacter pylori*, and influenza
- Molecular biology of malaria, dengue, melioidosis, and type 2 diabetes
- Human antibody for malaria and COVID-19
- Prognostic factors of dengue, hepatitis, and *Helicobacter pylori*
- Pathophysiology of COVID-19

ON-GOING RESEARCH

There are a total of 25 research projects currently on-going at the Department of Clinical Tropical Medicine. The Department researchers and staff lead many research projects and studies in several areas of diseases, including vaccines for malaria, dengue, HIV, chikungunya, COVID-19, UTI, MPOX, and pneumococcal disease. The Department also conducts numerous projects focused on the diagnosis and treatment of infectious and non-communicable diseases.

SERVICES

Mahidol University, Tropical Medicine Short–term Training

The Department of General Medicine at Juntendo University partners with the Departments of Protozoology and Clinical Tropical Medicine at Mahidol University to offer annual training sessions for Japanese medical professionals. This training focuses on increasing their knowledge of infectious diseases common outside Japan, particularly those transmitted by parasites, mosquitoes, water, and soil. Participants learn about diagnosing and treating diseases like malaria and other tropical illnesses, while also receiving practical training and conducting bedside studies.

Training Course on Diagnosis of Intestinal Parasites for Secondary School Students

The training course provides secondary school students with knowledge about the clinical aspects of intestinal parasitic diseases, covering both protozoan and helminthic parasites. Participants learn basic laboratory methods for detecting these parasites. This includes techniques for identifying parasites present in stool samples, which are fundamental skills for conducting further studies and engaging in work within the field of medical sciences.

The Annual Health Screening Program

The annual health screening program is designed to offer health check-ups to employees in both public and private sectors, with the goals of promoting health and enhancing quality of life. By providing regular health assessments, the program enables early detection and treatment of common diseases. It includes a variety of general health assessments such as blood pressure checks, common biochemistry evaluations, and chest x-rays. In addition, the program is customized to meet the specific needs and preferences of each organization and individual participant.

RESEARCH HIGHLIGHTS

Single Ad26.COV2.S booster dose following two doses of BBIBP–CorV vaccine against SARS–CoV–2 infection in adults: Day 28 results of a phase 1/2 open–label trial

Prof. Emer. Punnee Pitisuttithum and Assist. Prof. Sant Muangnoicharoen examined the safety and immunogenicity of a single Ad26.COV2.S booster dose administered healthy Thai adults who had previously received two doses of the BBIBP-CorV vaccine. They found that the booster was well-tolerated and significantly boosted both antibody and T-cell responses against SARS-CoV-2, including various variants. This study was a multi-collaborative work between Mahidol University's Faculty of Tropical Medicine and Faculty of Science, Faculty of Medicine Thammasat University, National Vaccine Institute Thailand, International Vaccine institute, Thai MOPH, BIOTEC NSTDA, and Janssen Medical Affairs.

Activity of Ivermectin and its metabolites against asexual blood stage *Plasmodium falciparum* and Its interactions with antimalarial drugs

Prof. Kesinee Chotivanich and team presented their study at JITMM 2023

Prof. Kesinee Chotivanich explored the potential of pharmacodynamic drug-drug interactions of ivermectin with artemisinins, ACT-partner drugs, and atovaquone *in vitro* using mixture assays providing isobolograms and derived fractional inhibitory concentrations. She found that ivermectin exhibits antimalarial effects at very high concentrations and does not interact with other antimalarial drugs. Due to its mosquitocidal effect, ivermectin remains a promising candidate to accompany other malaria-elimination tools.

Healthcare seeking during travel: an analysis by the GeoSentinel surveillance network of travel medicine providers

Assoc. Prof. Watcharapong Piyaphanee published his study in the high-impact *Journal of Travel Medicine* that focused on the importance of pre-travel consultation. Between May 2017 and June 2020, data from travelers seeking healthcare abroad were analyzed, excluding those seeking rabies prophylaxis. 1,093 travelers sought unplanned healthcare for issues like acute diarrhea and dengue, with many receiving care in 131 countries. Some experienced deterioration (3%), while others saw no change (21%). Further, 41 travelers sought planned healthcare abroad, often due to unavailability of procedures or expertise, lower cost, or convenience at home. Travelers obtaining planned healthcare abroad can experience negative health consequences associated with treatments abroad, for which pre-travel consultations could provide advice and potentially help to prevent complications.

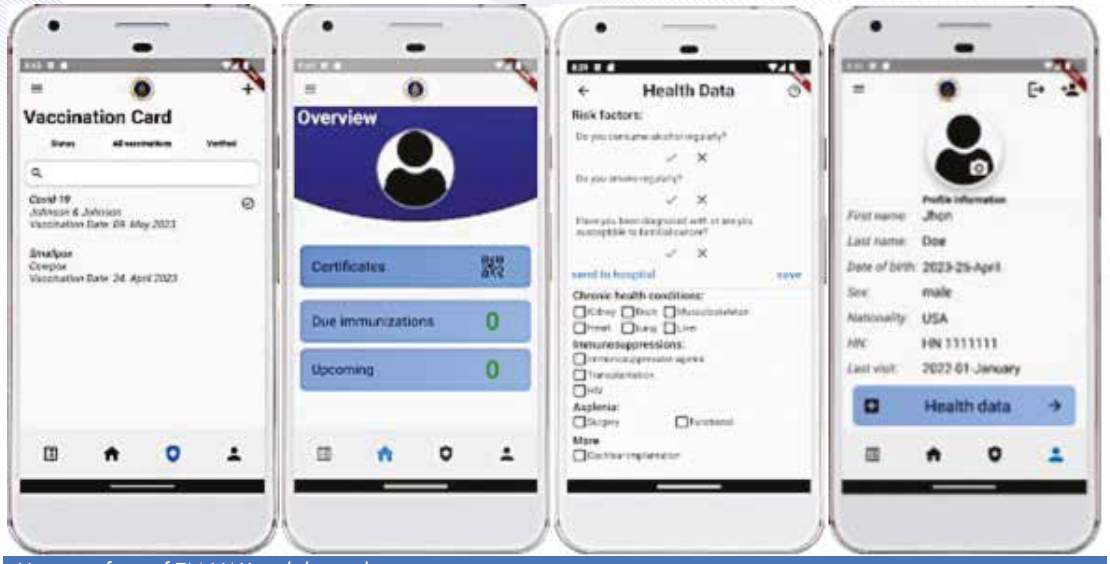
Immune response and safety of fractional (half) third doses of different COVID–19 vaccines following two doses of CoronaVac

The study by Prof. Emeritus Punnee Pitisuttithum aimed to compare the immunogenicity and safety of fractional (half) third doses of heterologous COVID-19 vaccines (AZD1222 or BNT162b2) to full doses after the two-dose CoronaVac with three different extended intervals. At 60-<90, 90-<120, or 120-180 days intervals after the two-dose CoronaVac, participants were randomized to full-dose or half-dose AZD1222 or BNT162b2, followed up at day 28, 60, and 90. Vaccination-induced immune responses to Ancestral, Delta, and Omicron BA.1 strains were evaluated by antispike, pseudovirus, microneutralization and T cell assays. No safety concerns were reported. All assays and intervals showed noninferior immunogenicity between full doses and half doses. However, full-dose vaccines and/or longer 120-180-day intervals substantially improved the immunogenicity measured by antispike or by pseudo virus neutralizing titer 50. (P <0.001).

INNOVATION, TRANSLATION, SOCIAL IMPACT

TM VAX mobile application for vaccination registry

In collaboration with University of Bremen, Germany, Assoc. Prof. Thundon Ngamprasertchai developed “TM VAX”, a mobile application for systematically storing and accessing the vaccination registry and history of patients receiving vaccinations at the Hospital for Tropical Diseases via cloud-computing system. This project was initiated due to doctors not having the patients’ previous vaccination records, and patients forgetting their vaccination history. Through this innovative system, patients will be able to track their vaccination history using their mobile phones. Moreover, the doctors can follow up on vaccine information immediately and provide appropriate medical advice. Dr. Thundon has applied for a patent for the mobile application.



User interface of TM VAX mobile application

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Polrat Wilairatana was promoted to Higher Salary Professor Level 2 and Dr. Vipa Thanachartwet received her Professorship rank.

Dr. Chayasin Mansannguan, Dr. Thundon Ngamprasertchai and Dr. Natthida Sriboonvorakul were promoted to Associate Professor.

Prof. Polrat Wilairatana

Prof. Vipa Thanachartwet

VISITING/ ADJUNCT PROFESSORS

Prof. John Adams from the University of South Florida, USA and Prof. Gerard Thomas Flaherty from the National University of Ireland Galway, Ireland joined the Department of Clinical Tropical Medicine as Adjunct Professors.

Assoc. Prof. Chayasin Mansannguan

Assoc. Prof. Thundon Ngamprasertchai

Assoc. Prof. Natthida Sriboonvorakul

Prof. John Adams

Prof. Gerard Thomas

Prof. Bee Kang Tan from the University of Leicester, United Kingdom and Assoc. Prof. Hu Jiamiao from the Department of Agricultural Science, Fujian Agriculture and Forestry University, China, joined as Visiting Professors. Prof. Arjen Dondorp and Prof. Nicholas Day from MORU were Visiting Professors, as well.

The Adjunct Professors and Visiting Professors are involved in teaching, research, and seminar activities of the Department.

Prof. Emeritus Punnee Pitisuttithum receives the Research Award from Her Royal Highness Princess Maha Chakri Sirindhorn on 21 April 2023, Napalai room, Dusit Thani Pattaya Hotel, Chonburi.

Prof. Arjen Dondorp

Prof. Nicholas Day

HONORS AND AWARDS

Assoc. Prof. Jittima Dhitavat was awarded the United Kingdom Professional Standards Framework (UKPSF) Level Senior Fellow (SFHEA) on 11 November 2023 at Mahidol University. The Senior Fellowship is awarded to professionals with a sustained record of leading or influencing the practice of those who teach and/or support high-quality learning, among others.

Prof. Kesinee Chotivanich was bestowed “Role Model Lecturer” by the Lecturer Council, Faculty of Tropical Medicine, Mahidol University, on 27 April 2023.

Prof. Emeritus Punnee Pitisuttithum received three prestigious accolades in 2023. She was awarded Researcher of the Year, Lifetime Achievement by Mahidol University on 2 March 2023, the Research Award by the Royal College of Physicians of Thailand on 21 April 2023, and the TRF Senior Research Scholar Award by the National Research Council of Thailand on 7 August 2023.

Prof. Emeritus Punnee Pitisuttithum

Prof. Kesinee Chotivanich

Assoc. Prof. Jittima Dhitavat

DEPARTMENT OF HELMINTHOLOGY

Assoc. Prof.
Dorn Watthanakulpanich
Head

The Department of Helminthology has been established alongside the Faculty of Tropical Medicine for 64 years now. The Department aims to support the Faculty in teaching, research, and academic services. Current research focuses on various areas, including Biology Ecology and Diversity, Systematic and Taxonomy, Epidemiology and Community Health, Immunodiagnostics, Molecular Helminthology, Medical herb research for anthelminthic applications, Helminth Biobanking and Population Genetics. The Department's vision is to become the Asia-Pacific Reference Center for helminthic infections, aiming for more international collaborations with other academic institutes and universities. Departmental staff are divided into five groups: Helminthic diseases and treatment, Community-based research and services, Asia-Pacific Biobank and DNA data references, Asia-Pacific Diagnostic Center and Anthelminthic Drug Development.

> The Department of Helminthology has been established alongside the Faculty of Tropical Medicine for 64 years now.

FACTS AND FIGURES 2023

7	8	24	6
Academic Staff	Support Staff	Publications	Students

RESEARCH FOCUS

- Diagnostic development for helminthic diseases
- Helminth therapy
- Biodiversity
- Molecular biology of parasites

ON-GOING RESEARCH

Current research projects focus on the detection and diagnosis of various helminthic infections. Dr. Abigail Hui En Chan is leading the project "Developing and Implementing an Effective Approach for Soil-Based Detection of Livestock Helminth Infections", while Asst. Prof. Orawan Phuphisut is spearheading the "Development of CRISPR-Cas based method for detection of *Opisthorchis viverrini* in fecal samples". Both studies are supported by Mahidol University's strategic research fund. Assoc. Prof. Poom Adisakwattana is leading efforts in the "Development of Diagnostic Tests for Hepatobiliary Flukes," funded by The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc. In addition, Asst. Prof. Kittipong Chaisiri is overseeing research on "Pandemic literacy and viral zoonotic spillover risk at the frontline of disease emergence in Southeast Asia to improve pandemic preparedness," funded by Horizon Europe.

RESEARCH HIGHLIGHTS

Opportunities and trends in the molecular detection and diagnosis of *Strongyloides stercoralis*

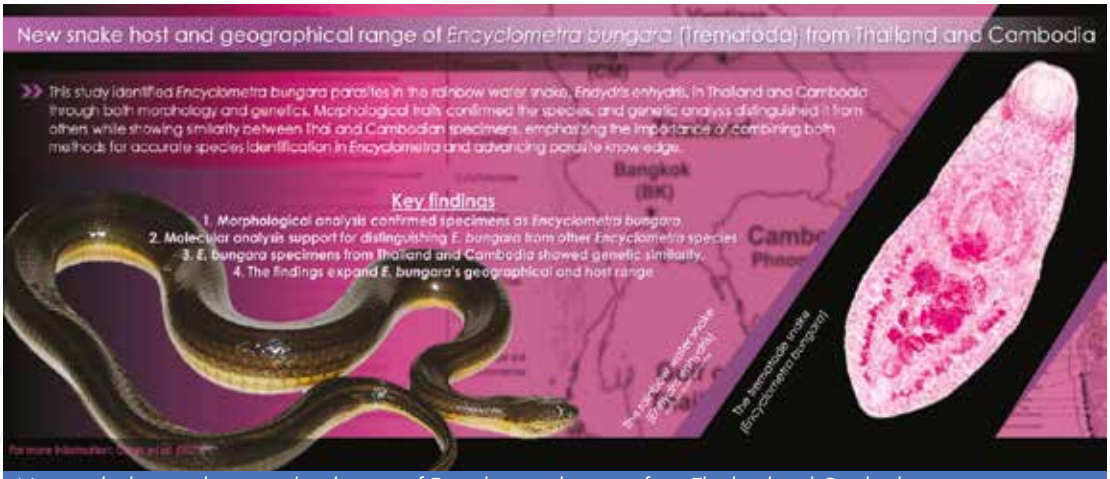
Dr. Abigail Hui En Chan and Assoc. Prof. Urusa Thaenkham published their work in *Parasites* and *Vectors* that presented a review to consolidate current molecular techniques for detecting and diagnosing *Strongyloides stercoralis*. The review also discusses upcoming molecular trends, particularly NGS technologies, to raise awareness of their diagnostic potential. The study is a significant scientific contribution as *S. stercoralis* was recently included by the World Health Organization as another soil-transmitted helminth targeted for control from 2021 to 2030. *S. stercoralis* is a soil-transmitted helminth that is mainly found in tropical and subtropical regions, which affects approximately 600 million people globally.

Prevalence of *Strongyloides* in Southeast Asia

Following PRISMA guidelines, Dr. Abigail Hui En Chan and Assoc. Prof. Urusa Thaenkham conducted a systematic literature search in PubMed and Google Scholar databases to identify studies reporting Strongyloides prevalence data in the 11 Southeast Asian countries up to December 2022. The estimated pooled prevalence of *S. stercoralis* regionally was 12.7% (95% CI 10.70–14.80%), ranging from 0.4 to 24.9% at the country level. A high prevalence of strongyloidiasis in Southeast Asia was revealed, highlighting the importance of the region's ongoing research, surveillance, and control efforts.

New snake host and geographical range of *Encyclometra bungara* from Thailand and Cambodia

Mr. Vachirapong Charoennitiwat and Dr. Abigail Hui En Chan conducted morphological and molecular identification to determine the *Encyclometra* species infecting *Enhydris enhydris* from Thailand and Cambodia. They revealed that the specimens could be morphologically identified as *E. bungara,* with support of molecular information obtained from the phylogenies of the 3 genetic markers employed. Through morphological and molecular identification of the *Encyclometra* specimens found in *E. enhydris* from Thailand and Cambodia, they described and provided a record of *E. bungara* in a new host and new locality.



New snake host and geographical range of Encyclometra bungara from Thailand and Cambodia

Molecular insights versus morphological traits

Ms. Chanisara Kaenkaew and Assoc. Prof. Urusa Thaenkham conducted a study of Angiostrongylus spp. specimens from five zoogeographical regions in Thailand, utilizing morphological and molecular identification methods. They employed the mitochondrial cytochrome b gene and the nuclear internal transcribed spacer 2 region (ITS2) for this purpose. Their findings revealed common morphological misidentifications between the closely related *Angiostrongylus cantonensis* and *Angiostrongylus malaysiensis* due to overlapping morphological characters. Additionally, the ITS2 results uncovered hybrid forms (8.2%), further complicating morphological identification.

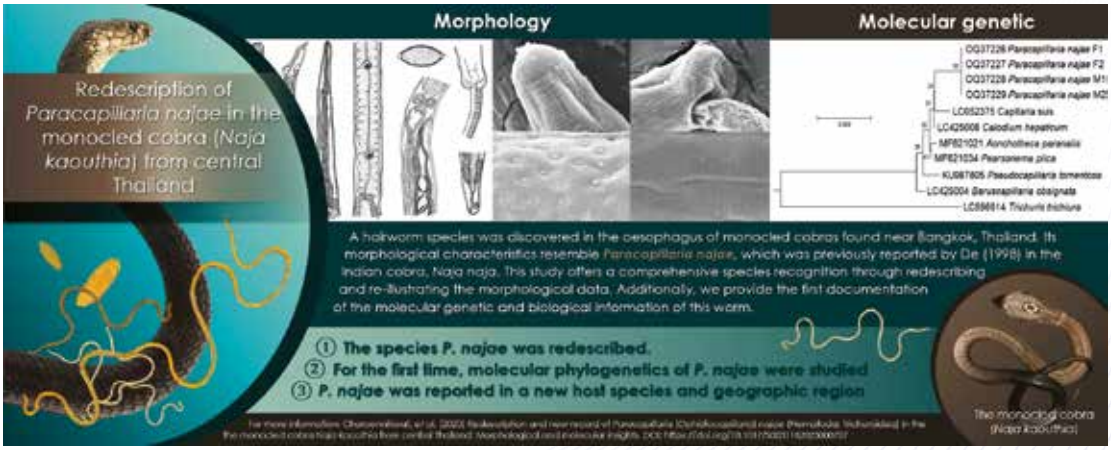
Redescription and new record of *Paracapillaria (Ophidiocapillaria) najae* (Nematoda: Trichuroidea) in the monocled cobra (*Naja kaouthia*) from central Thailand

Mr. Vachirapong Charoennitiwat and Assoc. Prof. Urusa Thaenkham have identified the monocled cobra *Naja kaouthia* as a new host for *Paracapillaria (Ophidiocapillaria) najae* in central Thailand. Their study provides a detailed description, expanding on both morphological and molecular characteristics of the parasites to facilitate future species recognition. Phylogenetic analyses using mitochondrial cytochrome c oxidase subunit 1 and nuclear 18S ribosomal RNA genes confirm its identity as *P. najae* despite being found in different hosts. The study discusses morphological descriptions, genetic sequences, and new host records of *P. najae*, indicating its prevalence across various cobra species in the Oriental regions.

INNOVATION, TRANSLATION, SOCIAL IMPACT

AI and stool examination

Object detection, an emerging artificial intelligence (AI) methodology, offers a promising solution for recognizing and labeling parasitic pathogens, particularly in remote areas of underdeveloped countries where equipment and expertise are limited; this innovation enables access to diagnostic services. The study of Assoc. Prof. Dorn Wattanakulpanich utilized YOLOv4-Tiny, a known fast and efficient object detection model, to automate the recognition of intestinal parasitic objects in human stool samples. His team identified 34 intestinal parasitic classes using image datasets collected from stool examinations, marking the first successful detection of protozoan cysts and helminthic eggs using object detection techniques.



SPECIAL ACTIVITIES AND HIGHLIGHTS

The 3rd Thai–Taiwanese Young Parasitologist Summer Camp 2023

The Department of Helminthology continued its collaboration with National Chiayi University, Taiwan for three years, hosting Prof. Hsuan-Wien Chen and his students at the Thai-Taiwanese Young Parasitologist Summer Camp 2023 during August 7-30, 2024, in Thailand. The Department-provided training covered microscopic and morphological studies, immunodiagnosis, molecular approaches, and community research. The participants also engaged in field parasitological practices at the Tropical Disease Research Center, Mahidol University Kanchanaburi Campus, and the training concluded with a seminar facilitating knowledge exchange between students and researchers from both institutions.

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Orawan Phuphisut was promoted to Assistant Professor in 2023.

VISITING/ADJUNCT PROFESSORS

Professor Geoffrey Gobert, of Queen's University Belfast, United Kingdom, served as a Visiting Professor for the Department of Helminthology. He gave a Special talk on "New molecular diagnostics for zoonotic helminth diseases: from the host to the environment" to the students and staff of the Faculty of Tropical Medicine, Mahidol University.

Prof. Gobert (standing center) with participants of his special talk

DEPARTMENT OF MEDICAL ENTOMOLOGY

Assoc. Prof.
Patchara Sriwichai
Head

The Department of Medical Entomology is one the first 5 departments created at the founding of the Faculty in 1960. The Department is actively involved in education, research and public service. Apart from the regular Medical Entomology subjects for the D.T.M.&H., M.Sc. (Trop. Med.) and Ph.D. (Trop. Med.) programs, the Department provides training on medically important insects/ arthropods and vector control both for individuals and groups upon request. Student dissertation topics span a wide range of issues in molecular and applied medical entomology. Dissertations include basic field work, application of control measures, and biotechnology. The main research involves basic and applied knowledge applicable to controlling insects and arthropods that are vectors of tropical diseases, with emphasis on mosquito-borne diseases. In addition, the Department of Medical Entomology houses the Mosquito Insectary and provides standard healthy mosquitoes to support research projects.

FACTS AND FIGURES 2023

7	12	18	13	2	9	-
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> The Department of Medical Entomology is one the first 5 departments created at the founding of the Faculty in 1960.

RESEARCH FOCUS

- Epidemiology and diagnosis of malaria and dengue
- Vector controls for malaria and dengue
- Biology and diversity of malaria and dengue
- Community health for malaria and dengue
- Molecular biology of dengue vectors
- Artificial intelligence on insect vectors

ON-GOING RESEARCH

Assoc. Prof. Patchara Sriwichai is leading three research projects. The first is uncovering the role of arbovirus vectors, *Aedes aegypti, Aedes scutellaris* and *Aedes albopictus* in maintaining arbovirus transmission cycles and human infections. Second is the production of mosquitoes for ivermectin evaluation. Lastly, the detection of dengue infection from natural mosquito vectors in dengue-endemic areas. These projects are supported by the Fundamental Fund 2023, Mahidol Oxford Tropical Medicine Research Unit under a Prime award funded by The Bill and Melinda Gates Foundation, and KAO Japan Company, respectively.

Asst. Prof. Thipruethai Phanitchat is developing anti-mosquito detergent and fabric care products with support from the Pre-seed Fund of Mahidol University.

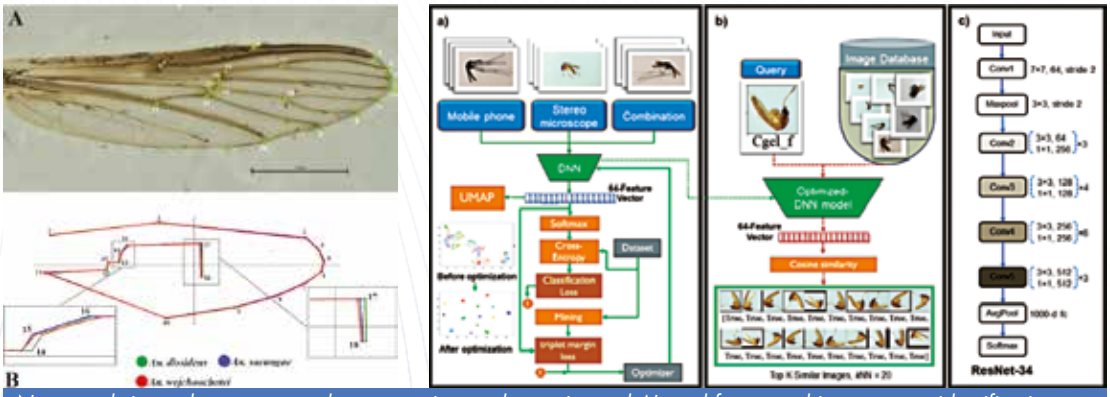
With funding from Fundamental Fund 2023, Assoc. Prof. Rutcharin Potiwat is conducting a study on native-Wolbachia efficacy to dengue virus infection in two *Aedes* spp. mosquitoes, *Aedes albopictus* and *Aedes scutellaris*. She is also studying vector-borne zoonoses disease accumulation from bats and pets, with support from the Rising Strategy Fund 2023.

Dr. Raweewan Srisawat is currently a consultant for practical training for rearing *Aedes* mosquito and testing of insecticide efficiency, supported by Thanakorn International Co. Ltd. She also received funding from KAO Japan Company to study the biological effect of Test Articles through understanding of the host-seeking behavior of female mosquitoes.

Dr. Sungsit Sungvornyothin is evaluating the larvicide efficacy of Temephos-coated products and *Aedes aegypti* larvae according to the SOP 13-02-291, with a grant from BASF Co., Ltd.

RESEARCH HIGHLIGHTS

Six publications on modern taxonomy of species complex of mosquito vectors



New trends in modern taxonomy by geometric morphometrics and AI used for several insect vector identifications to species and species complex level.

Assoc. Prof. Suchada Sumruayphol investigations on modern taxonomy of species complex of mosquito vectors produced six publications in high-impact journals. The increasing trend of the alternative advanced technology by geometric morphometric principles to contribute to insect identification up to species complex levels of *Anopheles barbirostris* complex, *An. dirus* complex, a major Japanese Encephalitis Vector *Cx. vishnui*, secondary filariasis vector *Coquillettidia* mosquitoes, and bugs. Moreover, Mr. Yudthana Samung purposed the increasing trend of an alternative AI approach to contribute to insect identification to species level.

Research collaboration with Japanese company to develop a potential control compound against mosquito vectors

Hydroxyapatite-binding silver/titanium dioxide, a potential control compound against mosquito vectors

In collaboration with a Japanese company, Dr. Raweewan Srisawat, Assoc. Prof. Patchara Sriwichai, and Assoc. Prof. Jiraporn Ruangsittichai developed a nonwoven fabric sheet coated with HATS compound (Hydroxyapatite-binding Silver/ Titanium Dioxide) that was able to kill mosquito larvae and is, therefore, a promising larvicidal agent for *Aedes aegypti* (dengue vector) and *Anopheles dirus* (malaria vector). In the near future, this compound can be used as a larvicidal tablet or granules. Their work was published in two articles, in the Journal of Medical Entomology and Infection, Genetics and Evolution.

Two new species of ant in Thailand and Laos

Polyrhachis quadrispinosa body in profile view

Mr. Yudthana Samung and collaborators from the National Museum of Thailand discovered two new species of ants; *Polyrhachis quadrispinosa* Jaitrong & Noon-anant, sp. nov., which was found in a dead twig on a rubber tree and *P. lao* Jaitrong & Yamane, sp. nov., collected in a dead wood in Laos. In Thailand, they found and recorded the ant *P. sukarmani* Kohout, 2007.

INNOVATION, TRANSLATION, SOCIAL IMPACT

Inventory design for mosquito sucking device received a patent

Mr. Theerawit Phanphoowong and Dr. Raweewan Srisawad's invention for a mosquito sucking device was awarded a patent by Thailand's Department of Intellectual Property. They designed a cheaper and practical device for mosquito sucking that is safe and more convenient for workers particularly in insecticide testing and common routines.

Research to guide policy

Assoc. Prof. Patchara Sriwichai and Dr. Sungsit Sungwornyothin produced five publications on malaria and dengue vector controls programs that can contribute and support current vector control policy at national and regional levels. Their studies include vector-control strategies and vector-borne-disease elimination approaches in the Greater Mekong Subregion.

SUSTAINABLE DEVELOPMENT GOALS

Assoc. Prof. Suchada Sumruayphol and Mr. Yudthana Samung's research on modern mosquito taxonomy contributes to several Sustainable Development Goals (SDGs). By using advanced methods like geometric morphometrics and AI, they improve identification of mosquito species complexes, aiding disease-control efforts (SDG 3; Good Health and Well-being). Their work also enhances understanding of biodiversity patterns, supporting SDG 15 (Life on Land). The collaboration in their research reflects SDG 17's emphasis on partnerships for achieving goals effectively.

Assoc. Prof. Patchara Sriwichai and Dr. Sungsit Sungwornyothin's research, covering five publications, supports SDG 3. Their focus on malaria and dengue vector-control programs, particularly in the Greater Mekong Subregion, provides important insights for effective policy planning. Moreover, their work fosters collaboration and knowledge sharing, aligning with SDG 17: Partnerships for the Goals, to advance efforts in combating vector-borne diseases and improving health outcomes.

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Thipruethai Phanitchat was promoted to Assistant Professor.

VISITING/ADJUNCT PROFESSORS

Prof. Jean-Pierre Dujardin from the French National Research Institute for Sustainable Development (IRD) has been an Adjunct Professor for the Department of Medical Entomology.

HONORS AND AWARDS

Assoc Prof. Jiraporn Ruangsittichai was honored as “Model Teacher of the Year” by the Faculty Tropical Medicine Council, Mahidol University

The Institute for Technology and Innovation Management (iNT) awarded Mr. Theerawit Phanphoowong and Dr. Raweewan Srisawat a patent for their invention of a mosquito sucking device.

Ms. Preeyanate Datong, Scientist, received the Best Paper Award for her presentation titled “Possibility of Free-Mating Malaria Vector in the Laboratory” at the 7th TICC International Conference 2023: Towards Sustainable Development Goals: Digital transformation and beyond, held on 4-5 February 2023, Centara Riverside Hotel, Chiang Mai, Thailand.

DEPARTMENT OF MICROBIOLOGY AND IMMUNOLOGY

Assoc. Prof.
Nitaya Indrawattana
Head

The Department of Microbiology and Immunology stands as a distinguished center for teaching and research. The Department offers internationally recognized graduate programs in Tropical Medicine, attracting a diverse student body from over 42 countries.

The Department's commitment to a rigorous academic environment – including expert faculty, modern facilities, and an active, student-centered learning approach – has produced a substantial and successful graduate cohort with international representation.

A core pillar of the Department is its research focus on the microbiology, immunology, and molecular biology of tropical diseases. The Department's expertise encompasses malaria, enteric bacterial infections, melioidosis, and other critical health challenges. Strategic collaborations with leading national and international research institutions underpin this work. Discoveries have been published in high-impact peer-reviewed journals. The Department's commitment to excellence is further demonstrated by Faculty awards, patents, and their influential roles in esteemed academic organizations.

FACTS AND FIGURES 2023

11	15	41	18	2	26	10
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> The Department offers internationally recognized graduate programs in Tropical Medicine, attracting a diverse student body from over 42 countries.

RESEARCH FOCUS

- Diagnosis, vaccines, and treatments for melioidosis
- Dengue vector control
- Diagnosis development for dengue and chikungunya
- COVID-19 epidemiology, community health, human antibody
- T-cell response and biomarkers

Academic and Support Staff of the Department of Microbiology and Immunology during their Strategy Enhancement Workshop

ON-GOING RESEARCH

Prof. Narisara Chantratita leads several important research studies on melioidosis funded by the Defense Threat Reduction Agency (DTRA) and the National Institute of Health (NIH) USA. She also heads the Southeast Asia initiative to combat SARS-CoV-2 variants (SEACOVARIANTS) with support from the Wellcome Trust, the UK.

Prof. Passanesh Sukphopetch conducts research on antifungal peptides using immunopeptidomics and secretomics, funded by the Health Systems Research Institute.

Assoc. Prof. Pornsawan Leaungwutiwong leads projects on viral diseases and arbovirus surveillance, funded by the National Research Council of Thailand and the Office of National Higher Education Science, Research, and Innovation Policy Council.

Assoc. Prof. Nitaya Indrawattana investigates quorum sensing in *Acinetobacter baumannii*'s pathogenesis and antibiotic resistance, funded by the National Research Council of Thailand.

Assoc. Prof. Pornpan Pumirat's research focuses on human neuronal pathogenesis and protein expression, supported by grants from the National Research Council of Thailand and Mahidol University.

SERVICES

The Department's service offerings include bioassays, cell toxicity assays, lyophilization, and specialized diagnostic tests for infectious diseases, including rapid tests (ICT), immunofluorescence assays (IFA), and latex agglutination. These services aid in evaluating antimicrobial activity, substance stability, and disease detection, ensuring quality control and effective treatments.

SEACOVARIANTS consortium research network meeting in Cape Town, South Africa, 25-27 September 2023

RESEARCH HIGHLIGHTS

SEACOVARIANTS Consortium

Prof. Narisara Chantratita, Dr. Prapassorn Poolchanuan, and Mr. Adul Dulsuk are part of SEACOVARIANTS, a platform for assessing SARS-CoV-2 variants' significance and supporting policymakers. It involves teams from Southeast Asia, the UK, and the USA, aiming to enhance regional scientific capacity for future outbreaks.

A study published in mSphere examined humoral immune responses in COVID-19 patients and CoronaVac-vaccinated individuals, finding elevated antibody levels in both groups, particularly against SARS-CoV-2 variants in COVID-19 patients. The study suggests different immune activation pathways between recovered and vaccinated individuals, impacting protection against new variants.

Additionally, a longitudinal study observed immune responses in COVID-19 patients over a year, including vaccinated and unvaccinated individuals. Neutralizing antibody levels peaked at day 14 post-infection, but declined after two months. Responses were strong against non-micron variants but weaker against omicron. Breakthrough cases showed stronger antibody reactions than unvaccinated individuals. This highlights the diverse immune responses influenced by strains of infection and individual hosts.

Melioidosis pathogenesis, diagnosis, and treatment strategies

Prof. Narisara Chantratita and collaborators are involved in a set of projects focused on understanding and combating melioidosis, a bacterial infection prevalent in Southeast Asia. The first project involves genomic and tissue analysis of melioidosis patients, examining both bacterial genome sequences and patient tissue samples to better understand the disease's genetic and pathological aspects in Thai populations.

In parallel, Prof. Narisara conducts an observational study on hospitalized patients with fever and suspected melioidosis, aiming to delineate the clinical progression and treatment responses among this patient group. Another work investigates the association between innate-like lymphocytes and patient outcomes in melioidosis, with focus on predicting mortality in community-acquired sepsis cases in northeast Thailand. In addition, the research team is exploring the potential of plasma metabolites as diagnostic markers for melioidosis, utilizing an unbiased "omics" approach to identify and validate specific metabolite signatures that can aid in diagnosing infection, pneumonia, or sepsis, and predicting patient outcomes. These projects contribute to advancing our understanding of melioidosis pathogenesis, diagnosis, and treatment strategies.

Emerging and re–emerging zoonotic viral diseases in Southeast Asia: One Health challenge

This review by Assoc. Prof. Pornsawan Leaungwutiwong, published in *mSphere*, provides an overview of important emerging and re-emerging zoonotic viral diseases in SEA, with emphasis on the main drivers behind their emergency, the epidemiological situation from January 2000 to October 2022, and the importance of One Health to promote improved intervention strategies.

Arbovirus researchers unite: expanding genomic surveillance for an urgent global need

Assoc. Prof. Pornsawan Leaungwutiwong and colleagues at Global Arbovirus Researchers United discussed the importance of global virus monitoring, highlighted by COVID-19 in **The Lancet Global Health.** Open data sharing and cross-border collaboration are crucial. GISAID, a successful model for rapid data exchange while protecting privacy, inspired EpiArbo, a new platform for sharing data on diseases like dengue and chikungunya, tailored to their unique aspects for evaluating control methods.

Diagnostic performance of dengue NS1 and antibodies by serum concentration technique

Assoc. Prof. Pornsawan Leaungwutiwong and Mr. Narin Thippornchai compared different methods for early dengue diagnosis. They found NS1 by ELISA to be the most accurate, followed by NS1 rapid test. Combining NS1 and IgM in a rapid test wasn't very helpful. However, by concentrating patient samples, they significantly improved the accuracy of the NS1 rapid test, making it almost perfect. This simple method could improve point-of-care dengue diagnosis.

Potential biomarkers for early ZIKV and DENV infections in hyperendemic regions, Thailand

Assoc. Prof. Pornsawan Leaungwutiwong, Assoc. Prof. Nathamon Kosoltanapiwat, Asst. Prof. Akanitt Jittmittraphap, and Ms. Siriporn Chattanadee investigated the immune response to Zika virus (ZIKV) and Dengue virus (DENV). They found that combining IgA and IgM tests improved ZIKV detection, especially in recent ZIKV cases with past DENV exposure. DENV triggered longer-lasting immune responses. Certain cytokines differed between the two viruses, suggesting IL-4 for ZIKV and IL-10 for DENV as potential diagnostic markers. Combining IgA and IgM tests with specific cytokines holds promise for earlier and more accurate diagnosis of ZIKV and DENV.

Phenotypic and genotypic investigation of carbapenem–resistant *Acinetobacter baumannii*

Assoc. Prof. Nitaya Indrawattana, Assoc. Prof. Pornpan Pumirat, Ms. Thida Kong-Ngoen, and Mr. Witawat Tunyong studied genetic traits of biofilm-forming carbapenem-resistant *A. baumannii* (CRAB) clinical isolates. They found a concerning predominance of biofilm-producing CRAB. All CRAB showed proteolytic activity and hemolytic-producing phenotype. REP-PCR revealed diverse DNA fingerprint patterns among CRAB isolates. Understanding these traits could help control CRAB spread in hospitals, improving patient care.

Deciphering the contribution of *Burkholderia pseudomallei* virulence factors to neurological melioidosis: a pathogenic perspective

Assoc. Prof. Pornpan Pumirat, Prof. Narisara Chantratita, Assoc. Prof. Nitaya Indrawattana, Prof. Passanesh Sukphopetch, Dr. Sarunporn Tandhavanant, and Ms. Amporn Rungruengkitkun examined Burkholderia intracellular motility A (BimA) in neurological infection. They found BimA is crucial for intracellular replication, spread, and regulating apoptosis and cellular toxicity. Their study also identified host factors regulated during *Burkholderia* infection, shedding light on the bacteria's mechanisms in establishing neurological melioidosis. Moreover, they investigated the role of the T6SS accessory protein TagAB-5 in B. pseudomallei pathogenicity using the human microglial cell line HCM3, a unique resident immune cell of the CNS acting as a primary mediator of inflammation. Their study indicated that microglia might be an important intracellular niche for B. pseudomallei, particularly in CNS infection, and TagAB-5 confers *B. pseudomallei* pathogenicity in these cells.

The study of tryptophol containing emulgel on fungal reduction and skin irritation

Prof. Passanesh Sukphopetch explored the properties of tryptophol, a fungal quorum sensing molecule with inhibitory effects on fungal growth. This study demonstrated its ability to inhibit 25 types of human pathogenic fungi at a concentration of 100mM. Subsequently, a 100 mM tryptophol emulgel cream was developed and tested on mice, effectively preventing the occurrence of 25 fungal-infected skin lesions. Further tests for allergenicity in mice and volunteers revealed no allergic reactions or irritation. Additionally, the cream reduced the expression of inflammatory cytokines, increased skin moisture, and statistically significantly reduced pigment activity

INNOVATION, TRANSLATION, SOCIAL IMPACT

Immunochromatography Test (ICT) generation 2

Prof. Narisara Chantratita and a postdoc scientist Dr Hasyanee Binmaeil developed a second-generation Immunochromatography Test (ICT) for melioidosis diagnosis. The ICT generation 2 enhances specificity and sensitivity, crucial for accurate detection. This advancement can lead to earlier identification and treatment, potentially saving lives in regions where melioidosis is endemic. Improved diagnostic tools not only reduce morbidity and mortality rates but also diminish the economic burden associated with prolonged illness.

The ICT generation 2 was approved by Thailand FDA, marking a pivotal step in melioidosis diagnosis. Commercially, its approval opens avenues for production and distribution, fostering public health improvement and community well-being through widespread availability and affordability.

ICT gen 2

Melimo Melioidosis real–time PCR kit

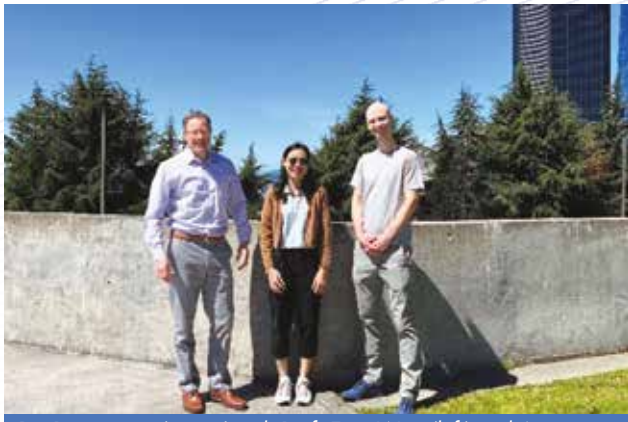
Prof. Narisara and a Ph.D. student, Dr. Chawitar Noparatvarakorn developed a real-time PCR kit for *Burkholderia pseudomallei* detection in clinical specimens.

Melimo Melioidosis real-time PCR kit

SPECIAL ACTIVITIES AND HIGHLIGHTS

Research training at University of Washington

Dr. Prapassorn Poolchanuan was awarded a Global Innovation Fund by the University of Washington to participate in 7-week research training on the



Dr. Prapassorn (center) with Prof. Eoin West (left) and Assist. Prof. Shelton Wright (right) at the University of Washington

Meso Scale Discovery technique at the University of Washington, USA. The training provides researchers with essential skills and knowledge for future immunological research, offering advanced capabilities for precise and sensitive detection of biomarkers and analytes in complex biological samples.

TMMI–Thai–UK–US Joint Scientific Meeting 2023: Knowledge Advancement and Idea Sharing in Tropical Medicine

The Department of Microbiology and Immunology hosted the "TMMI-Thai-UK-US Joint Scientific Meeting 2023: Knowledge Advancement and Idea Sharing in Tropical Medicine". This international seminar was held on December 16-17, 2023, at the Bay Window at Sea Hotel in Cha-Am District, Phetchaburi Province. The seminar aimed to exchange knowledge in tropical medicine, provide a platform for research collaboration among professors, scientists, and graduate students, stimulate innovation, and foster an international research network.

MICRO–IMMUNO SEMINAR SERIES 1: Threats of Emerging Viruses and Therapeutic Potentials of Super Antibody

The Department hosted a special lecture "MICRO-IMMUNO SEMINAR SERIES 1: Threats of Emerging Viruses and Therapeutic Potentials of Super Antibody" on 7 December 2023, at the Faculty's Pratap Singhasivanon Conference Room, Rajanakarin Building. The lecture covered knowledge sharing in microbiology and immunology, promoting innovation, and fostering research networks. It featured key topics such as "Threats of Emerging Viruses" by Prof. Yong Poovorawan of Chulalongkorn University and "Therapeutic Potentials of Super Antibody" by Prof. Wanpen Chaicumpa of Mahidol University.

VISITING/ADJUNCT PROFESSORS

Assist. Prof. Kristen Aiemjoy from the Davis School of Medicine, University of California joined the Department to collaborate with Prof. Narisara Chantratita and Mahidol Oxford Tropical Medicine Research Unit.

Prof. Paul J. Brett and Prof. Mary N. Burtnick, University of Nevada, Reno School of Medicine are Adjunct Professors of the Department collaborating with Prof. Narisara Chantratita.

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Passanesh Sukphopetch was promoted to Professor in Microbiology. Ms. Natnaree Saiprom and Ms. Amporn Rungruengkitkun were promoted to Scientist Professional Level.

HONORS AND AWARDS

Prof. Narisara Chantratita was appointed President of Mahidol University Faculty Senate on 6 November 2023. She was also included in Mahidol University's Top 1% Researchers.

Prof. Passanesh Sukphopetch received a Rangsit Alumni Award 2023 from Rangsit University.

DEPARTMENT OF MOLECULAR TROPICAL MEDICINE AND GENETICS

Prof. Mallika Imwong
Head

In today's rapidly advancing era, tropical medicine demands more than just an understanding of diseases. The Department of Molecular Tropical Medicine and Genetics, established in 2010, is dedicated to training and advancing research in molecular biology, informatics, and cutting-edge methodologies. Our expansive research covers parasite biology, cancer, molecular diagnostics, enzymology, and immunotherapy. Collaborating with various departments, hospitals, and institutes locally and internationally, we foster interdisciplinary approaches for innovative discoveries. The Department's globally-recognized master's and doctoral programs equip students with essential skills through rigorous training and hands-on experience. These programs prioritize diversity and inclusion, offering fellowships to support talented individuals from diverse backgrounds. Our programs offer a comprehensive blend of laboratory techniques and fieldwork, ensuring graduates are well-rounded professionals. In addition, the Department organizes special short courses on emerging issues and technologies in tropical medicine to keep students and researchers updated. The Department is dedicated to excellence in tropical medicine research and education, striving to contribute meaningfully to the global fight against tropical diseases and to nurture future leaders in the field.

FACTS AND FIGURES 2023

10	8	49	25	3	11	5
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> Our expansive research covers parasite biology, cancer, molecular diagnostics, enzymology, and immunotherapy.

RESEARCH FOCUS

- Malaria vaccines and diagnostics
- Helminth diagnostics and therapeutics
- Molecular biology of helminths

Staff of the Department of Molecular Tropical Medicine and Genetics

ON-GOING RESEARCH

Assoc. Prof. Wang Nguitragool is working on the development of a potent Pvs230 mRNA vaccine to block transmission of *Plasmodium vivax* with a grant from Global Health Innovative Technology Fund. He is also developing new diagnostic tools for tropical diseases with support from Mahidol University's Fundamental Fund (FF67).

With a Mahidol University Strategic Research Fund (Professional), Assoc. Prof. Onrapak Reamtong is conducting a project focusing on the identification of novel anthelminthic substances and their related mechanisms.

RESEARCH HIGHLIGHTS

Anthelmintic efficacy evaluation and mechanism of N−methylbenzo[d]oxazol−2−amine

Parasitic roundworms pose a serious threat to both animals and humans, impacting food production and health worldwide. Current anthelmintic drugs are not universally effective, and drug resistance

Assoc. Prof. Onrapak Reamtong

is a growing concern. A study by Assoc. Prof. Onrapak Reamtong and team revealed that N-methylbenzo[d]oxazol-2-amine (compound 1) has shown promise as an anthelmintic with low toxicity. In vivo testing on Trichinella spiralis-infected mice revealed a 49% reduction in worm abundance at a dose of 250 mg/kg, comparable to Albendazole. Molecular docking suggests different target pathways for compound 1, and metabolomics analysis indicates its impact on worm metabolism. Compound 1 holds potential for anthelmintic development pending further research on its bioavailability and pharmacokinetics.

A Pvs25 mRNA vaccine induces complete and durable transmission–blocking immunity to *Plasmodium vivax*

Assoc. Prof. Wang Nguitragool and colleagues at the Mahidol Vivax Research Unit (MVRU) examined the potential of the mRNA vaccine platform for transmission-blocking vaccine for P. vivax malaria. Using a mouse model, they demonstrated that an mRNA vaccine encoding the classic vaccine candidate, Pvs25, can stimulate a functional immune response that is stronger and more durable that the previous generation protein-subunit vaccine. Thus, the mRNA vaccine platform has great potential to advance malaria vaccine development.

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Charin Thawornkuno received his Assistant Professorship and Ms. Thitiluck Swangsri was promoted to Scientist Senior Professional Level.

VISITING/ADJUNCT PROFESSORS

Prof. Stuart Dean Blacksell from the University of Oxford, Nuffield Department of Medicine, Center for Tropical Medicine and Global Health, joined the Department as Visiting Professor.

HONORS AND AWARDS

Prof. Mallika Imwong received Mahidol University's National Outstanding Researcher Award in the field Medical Science. She was also included in the World's Top 2% Scientists by Stanford University in 2023. This ranking recognizes researchers who have made significant contributions to their respective fields.

Prof. Mallika Imwong (4th from right) and other recipients of the National Researcher Award.

Assoc. Prof. Onrapak Reamtong was bestowed "The Exemplary Lecturer on Technological Sciences" Award by Mahidol University. She was also included among the Outstanding University Employees who have worked for 10 years (but not over 20 years).

Assoc. Prof. Onrapak receives the award from Prof. Banchong Mahaisavariya, President of Mahidol University

DEPARTMENT OF PROTOZOOLOGY

Assoc. Prof.
Aongart Mahittikorn
Head

The Department of Protozoology was one of the first five departments formed at the founding of the Faculty of Tropical Medicine in 1960. The Department is involved in teaching, training, research, and services in the field of Medical Protozoa, conducting various studies and projects encompassing “from enzyme to community”. Moreover, the Department plays a significant role in the Thai medical and research community in providing diagnoses of protozoal diseases and supplying protozoal specimens to other institutions for their own research or teaching needs.

FACTS AND FIGURES 2023

6	8	21	3	2	3	1
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> “The Department of Protozoology was one of the first five departments formed at the founding of the Faculty of Tropical Medicine in 1960.”

RESEARCH FOCUS

- Malaria epidemiology and diagnosis
- Epidemiology of intestinal protozoa
- Molecular biology and diagnosis of Neospora caninum

ON-GOING RESEARCH

Assoc. Prof. Aongart Mahittikorn is investigating the efficacy of Ageratum conyzoides leaf and flower extracts and Stemona collinsiae root extracts against *Toxoplasma gondii* and working on the discovery of novel hit compounds selective for *Toxoplasma gondii* for the treatment of toxoplasmosis. His projects are supported by World University Rankings by Subject-Specific League Fund and Fundamental Fund-Basic Research Fund, respectively.

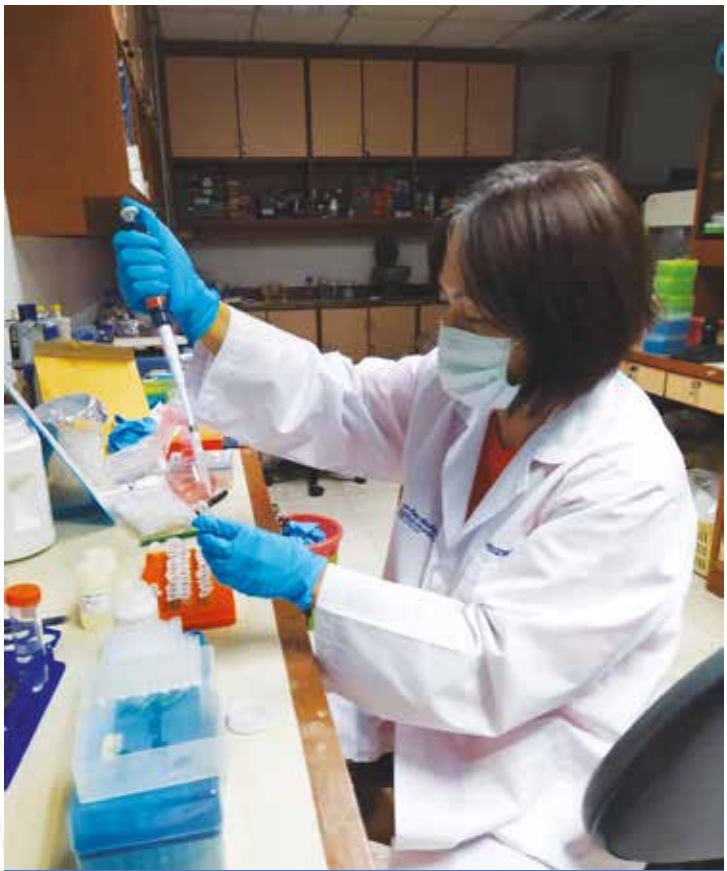
With support from the Mahidol University Strategic Research Fund, Assoc. Prof. Saengduen Moonsom is working on the development of a simple and rapid diagnosis of African Swine Fever Virus (ASFV) for field application.

Staff of the Department of Protozoology

RESEARCH HIGHLIGHTS

Prevalence and subtype distribution of *Blastocystis* isolated from school–aged children in the Thai–Myanmar border, Ratchaburi Province, Thailand

Assoc. Prof. Supaluk Popruk and MSc student Amanee Abu's study found *Blastocystis* infection in 3.35% of 508 samples from school-aged children near the Thai-Myanmar border. The most common subtype was ST3, similar to cattle-derived sequences, followed by ST1, similar to human-derived sequences. The study suggests that more research is needed to confirm zoonotic transmission, and improved hygiene and sanitation are recommended for children's health in the area.



Dr. Supaluk Popruk is extracting DNA to analyze the prevalence and subtype of Blastocystis from samples collected from School-Aged Children on the Thai-Myanmar Border.

Mass Spectrometry–based metabolomics revealed effects of metronidazole on *Giardia duodenalis*

Another study of Dr. Supaluk used metabolomics to explore how metronidazole affects *Giardia duodenalis*, a common protozoan causing diarrheal illness. They found 350 altered metabolites, highlighting changes in proteasome and glycerophospholipid pathways. Notably, they identified a unique enzyme in *G. duodenalis* that could be a promising target for new drugs against giardiasis, addressing concerns about treatment failures and drug resistance.

Systematic review and meta–analysis of *Plasmodium* infection

Assoc. Prof. Aongart Mahittikorn and collaborators published two articles in Scientific Reports. The first systematic review and meta-analysis assessed the prevalence and proportion of asymptomatic *Plasmodium* infection in Asia to address persistent malaria transmission in low-endemic areas. They analyzed 87 studies from five databases, finding a pooled prevalence of 5.8%, 9.4%, and 8.4% in Southeast, South, and Western Asia, respectively. They also found a high proportion of asymptomatic infections among all parasitized individuals, indicating a need for targeted elimination and control programs in Asia.

The second article examined the association between ovalocytosis and *Plasmodium* infection, addressing inconsistent findings. They analyzed 16 studies and found no significant link between ovalocytosis and malaria. They suggest further research to understand ovalocytosis' role in protecting against malaria or disease severity.

Recombinant dense granule protein (NcGRA4) is a novel serological marker for *Neospora caninum* infection in goats

Ms. Ruenruetai Udonsom and colleagues developed a method to detect *Neospora caninum* infection, a major cause of cattle abortion. They synthesized and purified a recombinant protein, NcGRA4, using commercial gene synthesis. This protein was tested on 214 goat serum samples using an indirect enzyme-linked immunosorbent assay (iELISA) and compared to the indirect fluorescent antibody test (IFAT). The results showed NcGRA4 iELISA had 71.6% sensitivity and 86.3% specificity compared to IFAT. The study suggests NcGRA4 as a promising marker for detecting *N. caninum* infection in goats.

Ms. Reunrutai Udonsom is collecting data and samples from goats for the project focused on developing a novel serological marker for Neospora caninum Infection in Goats

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Porntip Petmitr was promoted to Professor.

VISITING/ADJUNCT PROFESSORS

Dr. Claudia Barelli from the Department of Biology, University of Florence, Italy and Assoc. Prof. Hirotake Mori joined the Department of Protozoology as Visiting Professors.

Dr. Claudia Barell collaborates with Dr. Aongart for the project titled 'Microbial Composition and Parasitic Diversity in Wild White-Handed Gibbons'

HONORS AND AWARDS

Assoc. Prof. Aongart Mahittikorn received the Outstanding Alumni Award from the Faculty of Public Health, Mahidol University on 28 December 2023.

Dr. Aongart and Dr. Claudia collecting samples from wild white-handed gibbons in Khao Yai National Park

DEPARTMENT OF SOCIAL AND ENVIRONMENTAL MEDICINE

Assoc. Prof. Pongrama Ramasoota
Head

The Department of Social and Environmental Medicine, formerly known as the 'Department of Tropical Medicine', was among the five departments initially established with the Faculty of Tropical Medicine in 1960. Later, the academic and research activities of the Department have been expanded to become more multidisciplinary, starting from basic laboratory research to applied research in the community. The Department is also focusing on product development, some being commercialized by licensing companies. Their research activities can be summarized as "from laboratory to community and commercialization".

FACTS AND FIGURES 2023

9	12	20	12	3	12	6
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

RESEARCH FOCUS

- Environmental health
- Therapeutics for dengue and rabies
- Human antibody
- Epidemiology of malaria, helminths, and other tropical diseases
- Community health

> The Department of Social and Environmental Medicine, formerly known as the 'Department of Tropical Medicine', was among the five departments initially established with the Faculty of Tropical Medicine in 1960.

ON-GOING RESEARCH

Assoc. Prof. Kraichat Tantrakarnapa leads an e-Asia-funded project to assess climate change adaptation to smoke haze for improved child health in Southeast Asia. He is also supported by NRCT e-Asia to evaluate the health impact of climate change in Thailand. Moreover, Dr. Kraichat was awarded a grant by the Korean government to lead the CASA (Clean Air for Sustainable ASEAN) project under Seoul National University.

Asst. Prof. Yanin Limpanont is working on her project "Maintain Life Cycle of *Opisthorchis viverrini* and *Schistosoma mekongi*".

Dr. Panita Looareesuwan is conducting a cross-sectional study on normal weight obesity and lifestyle behaviors in the Thai population and a 10-year single-center retrospective study (2013-2022) on imported malaria among international travelers in Bangkok, Thailand.

Asst. Prof. Suparat Phuanukoonnon received a grant from TDR/WHO to evaluate the effectiveness of school-based training on larval control in households among secondary school students: participatory action research.

Assoc. Prof. Pannamthip Ramasoota was awarded a grant from MOTIP (MORU) for developing therapeutic human monoclonal antibodies against dengue virus (Anti E and Anti NS1).

Assoc. Prof. Athit Phetrak, with the Mahidol University Strategic Fund for Rising Star Researcher, is working on the project "Activated carbon surface adaptation to increase the adsorptive removal of Chromium Hexavalent from waste water".

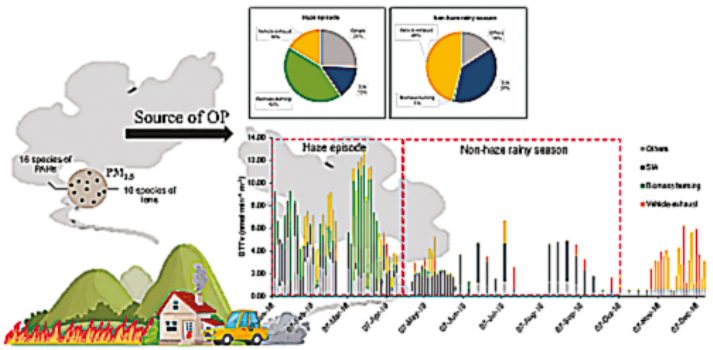
Ms. Sirirat SangkarukInfluence was funded by Kurita Water and Environment Foundation to investigate the influence of iron oxide particles in the adsorptive removal of tetracycline from water by magnetic powdered activated carbon.

Dr. Napassamon Utailak is studying the mass spectrometry-based proteomics and metabolomics in tropical diseases (helminthiases, malaria, and working on the production of recombinant pharmaceutical proteins in bacteria, microalgae, and plants for therapeutic uses.

RESEARCH HIGHLIGHTS

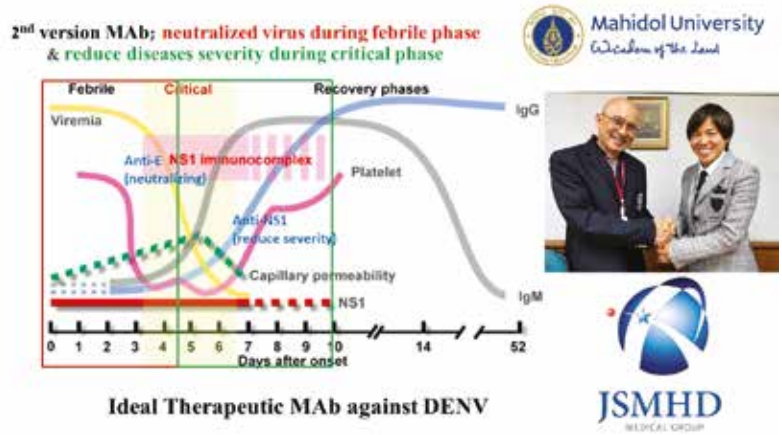
Sources of PM2.5 oxidative potential during haze and non–haze seasons in Chiang Mai, Thailand

Assoc. Prof. Kraichat Tantrakarnapa and team used dithiothreitol (DTT) assay to evaluate the



oxidative potential (OP) of PM2.5-bound substances, which can cause oxidative stress. They analyzed 16 PAHs and 10 inorganic ions in PM2.5 samples collected in 2018-2019 during haze and non-haze seasons in the Chiang Mai-Lamphun basin. During haze episodes, DTTv activity was linked to specific PAHs and inorganic ions, such as NH4+, SO42–, and NO3–. Biomass burning was identified as the main contributor to PM2.5 (57.9%) and DTTv activity (43.0%). The results, published in the Aerosol and Air Quality Research journal, suggest that higher PM2.5 levels during haze periods significantly affect OP, potentially leading to oxidative stress.

Therapeutic human monoclonal antibodies against dengue virus



Since 2021, the Advy company has licensed NhuMAb clone #54, which neutralizes DENV in the first 7 days of infection but does not prevent severe symptoms caused by the NS1 protein. To prevent this, Assoc. Prof. Pannamthip Ramasoota and Assoc. Prof. Pongrama Ramasoota developed NhuMAb clone #8, which neutralizes DENV and reduces severe dengue symptoms, with a patent in Thailand (#2301000031). Japan Shangri-LA Medical Holding plans to invest $12 million to commercialize and develop this antibody for the comprehensive treatment of DENV during both viremia and severe phases.

Effectiveness of training on mosquito larval control in household among secondary school students: participatory action

Asst. Prof. Suparat Phuanukoonnon studied the effectiveness of larval control practices in household water containers in Kaw Hmu Township, Yangon. Inspecting over 3,700 containers across rainy and dry seasons, she found *Aedes* larvae infestations were higher in the rainy season (6.6%) than the dry season (5.7%) and more common in non-potable water containers. Two-thirds of containers were treated with temephos, which was effective in cement basins, while weekly cleaning was effective in barrels. She concluded that combined methods worked best and that infestations were highest in unused and waste containers. Her study suggests that effective control in Myanmar requires ongoing surveillance and identification of key breeding sources.

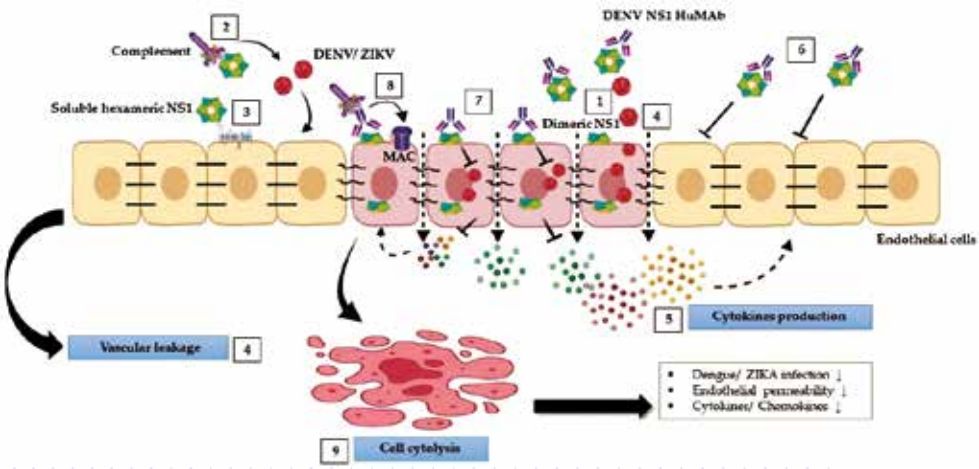
Larval survey activity in Kaw Hmu Township, Yangon, Myanmar

New insights into the adsorptive characteristics of trihalomethane precursors from surface water using magnetic powdered activated carbon

Powdered activated carbon (PAC) removes dissolved organic matter (DOM) but raises concerns about separation and brominated trihalomethane (THM) formation after chlorination. Therefore, Assoc. Prof. Athit Phetrak and Ms. Sirirat Sangkaruk developed and tested a novel Mag-PAC adsorbent for DOM removal and THM control from surface water, comparing it with PAC. Mag-PAC combined PAC's effectiveness with magnetic particles, showing efficient DOM removal (2.84–3.69 mg-C/g) and good magnetic separability (10.15 emu/g). The iron oxide coating, mainly crystalline goethite and magnetite, facilitated chemisorption of DOM. They found that Mag-PAC effectively adsorbed aromatic DOM, humic, and fulvic acids. It reduced lifetime cancer risks from THMs by lowering trichloromethane and bromodichloromethane formation, suggesting that Mag-PAC is a promising sorbent for controlling THM formation in surface water.

INNOVATION, TRANSLATION, SOCIAL IMPACT

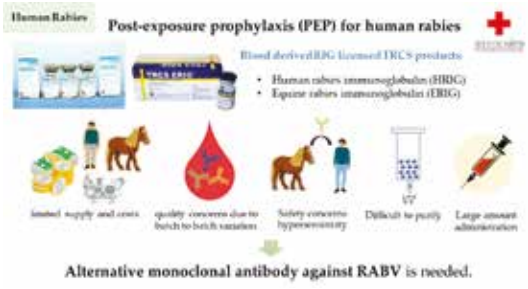
Commercialization of therapeutic human monoclonal antibodies against dengue virus



Assoc. Prof. Pannamthip Ramasoota and Dr. Rochanawan Sootichote discovered that DENV NS1-specific HuMAbs demonstrate therapeutic effects against both Dengue (DENV) and Zika (ZIKV) viruses through the complement pathway. Furthermore, it has been observed that both DENV and ZIKV NS1 trigger endothelial dysfunction, resulting in vascular permeability in vitro.

In collaboration with the "Baiya Phytopharm" company, affiliated with Chulalongkorn University, Mahidol University is expanding the production of antibody drug from plant cells to neutralized dengue virus. By inserting the DNA of the desired dengue fever antibody gene into plant cells, it becomes feasible to produce antibody drugs for treating dengue fever in large quantities efficiently. This innovative approach not only saves space but also reduces costs significantly. This innovation is undergoing commercialization, with plans for production in a GMP-standard factory.

Therapeutic human monoclonal antibodies against rabies virus



Assoc. Prof. Pongrama Ramasoota and Dr. Apidsada Chorpunkul (BIOTEC, NSTDA) are working on the development of therapeutic monoclonal antibodies against the rabies virus using immunized phage-displayed libraries, funded by the National Research Council of Thailand - Research and Researchers for Industries (NRCT-RRi).

SPECIAL ACTIVITIES

Training and workshops

Laboratory Training for the project "Enhancing the Study of Medically-important Freshwater Taxa of the Cambodian Mekong" supported by IRD

International and Thai short-term elective students from the Thai Travel Clinic

The workshop on "Enhancing the Study of Medically-important Freshwater Taxa of the Cambodian Mekong", organized at the Applied Malacology Unit, Department of Social and Environmental Medicine on 2-3 February 2023, was attended by participants from the Royal University of Agriculture, Cambodia, Faculty of Tropical Medicine, Mahidol University, Thailand, and the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, Malaysia. The workshop covered the importance of natural history collections and basic collections management with visits to the Mollusk Museum, Mahidol University. The practical sessions were arranged to improve the basic

technical method of detecting parasites in intermediate hosts.

The International and Thai short-term elective students from the Thai Travel Clinic, Faculty of Tropical Medicine, visited the Malacology Unit of the Department of Social and Environmental Medicine, where Asst. Prof. Yanin Limpanont and departmental scientists led and delivered academic talks to the physicians. This exchange facilitated knowledge-sharing on the burden of blood and liver flukes, enabling clinical applications and understanding potential health risks associated with travel in specific regions.

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Suparat Phuanukoonnon was promoted to Assistant Professor and Assoc. Prof. Pongrama Ramasoota was appointed a Collaborative Professor at Osaka University., Japan.

VISITING/ADJUNCT PROFESSORS

Prof. Serge Morand from University of Montepellier 2, France joined the Department as a Visiting Professor, with collaborations with Assoc. Prof. Kraichat Tantrakarnapa.

HONORS AND AWARDS

The work of Assoc. Prof. Pongrama Ramasoota and Assoc. Prof. Pannamthip Ramasoota on “Therapeutic Antibody against Dengue Virus” received the Leave a Nest Award for the Innovation and Euglena Award for Innovation on 22 July 2023 at King Mongkut’s University of Technology Thonburi (KMUTT), Bangkok, Thailand and on 26 August 2023 in Cyberjaya, Malaysia, respectively. Both awards were presented by Leave A Nest Organization (Japan)

Assoc. Prof. Kraichat Tantrakarnapa was honored with a CMU Distinguished Alumni Merit Recognition (Public Service) by Chiangmai University on 28 January 2024. He was also presented a Certificate of Health & Environmental Promotion Beneficial to Public Health by the Department of Health, Ministry of Public Health, Thailand.

DEPARTMENT OF TROPICAL HYGIENE

Assoc. Prof. Saranath Lawpoolsri Niyom
Head

The Department of Tropical Hygiene was established in 1974 and has long been involved in teaching and research at the Faculty. In addition to being involved in the academic programs of the Faculty, the Department is particularly responsible for the master's and diploma programs of the Biomedical and Health Informatics (BHI) course. The Department is recognized in the field of epidemiology for its expertise in the application of Information Technology (IT) and advanced analysis of various tropical diseases. Their research activities encompass epidemiology, biostatistics, mathematical modelling, geographical information system (GIS), machine learning, data management and data visualization. Moreover, the Department provides workshops, short training courses, and online courses on specialized topics.

FACTS AND FIGURES 2023

11	11	49	10	1	15	1
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> The Department of Tropical Hygiene was established in 1974 and has long been involved in teaching and research at the Faculty.

Staff of the Department of Tropical Hygiene

RESEARCH FOCUS

- Epidemiology of tropical diseases
- Clinical research in malaria, influenza, antimicrobial resistance
- Biostatistics
- Mathematical modeling
- Public health informatics
- Data management and data analysis

ON-GOING RESEARCH

Prof. Jaranit Kaewkungwal and Assoc. Prof. Saranath Lawpoolsri Niyom are involved in the research activities of the Southeast Asia Malaria Research Center (ICEMR), funded by the US National Institutes of Health (NIH).

With a grant from the National Center for Global Health and Medicine, Japan, Prof. Srivicha Krudsood is assessing the malaria-detection ability of new products in Thailand (Phase 1 and Phase 2).

Assoc. Prof. Saranath Lawpoolsri Niyom is working on data management and data analysis for a project "Test and Treat HIV and Viral Hepatitis for Most at Risk Populations in Central and Southeast Asia: The C-FREE-CSEA Study" through the support from the Dreamlopments (DLP) non-profit foundation. She has also received funding from Takeda Thailand to conduct a study titled "Evidence to support integrated strategy for dengue prevention and control".

Assoc. Prof. Wirichada-Pang-ngum is involved in the COVID-19 modelling activities and is the key training partner for the SPARK (Strengthening Preparedness in the Asia-Pacific Region through Knowledge), supported by the Doherty Institute, the University of Melbourne, under a Prime Award from the Department of Foreign Affairs and Trade (DFAT).

Asst. Prof. Ngamphol Soonthornworasiri is developing a network of foreign health volunteers to prevent and monitor COVID-19 disease with support from the Thai Health Promotion Foundation. He is also conducting a prospective cohort study on the surveillance of SARS-CoV-2 variants spreading in Thailand, funded by the AIDS Healthcare Foundation.

Asst. Prof. Chawarat Rotejanaprasert is working on three projects: (1) policy recommendations for the operation of public health volunteers in Kanchanaburi Province; (2) the impact of Hcp1-ICT and TTS1-qPCR implementation for the diagnosis of melioidosis and the evaluation of predictive biomarker for death from sepsis in endemic areas; and (3) the global and national spatiotemporal epidemiology of suicide mortality with associated risk factors: From global perspective to a case study in Thailand. These projects are funded by the Health Systems Research Institute (HSRI), Wellcome Trust iTP, and World University Rankings by Subject (Specific League Fund: SLF), respectively.

SERVICES

Statistics Clinic

The Department offers support in research statistics to researchers and students at the Faculty. The Department collaborates with the Office of Research Services in the coordination of appointments and management of requests.

Training and Workshops

The Department organizes specialized training courses on data management, mathematical modelling, public health informatics, and other related topics through onsite and online platforms. The Department collaborated with the University of Bremen for the workshop on public health informatics entitled "Where IT Meets Public Health" The workshop was held on 15-19 May 2023 at the Faculty of Tropical Medicine, Mahidol University. The workshop covered interesting topics, such as virtual reality, immersive visualization technique, Bayesian Network, and UI/UX design for web-based and mobile applications, among others.

RESEARCH HIGHLIGHTS

PLATCOV Study

Assoc. Prof. Podjanee Jittamala is involved in the PLATCOV study, an open-label, multicentre, phase 2, randomised, controlled, adaptive pharmacometric platform trial on COVID-19 running in Thailand, Brazil, Pakistan, and Laos. Their recent study compared the antiviral effects of molnupiravir and ritonavir-boosted nirmatrelvir on SARS-CoV-2 clearance in low-risk adults with early symptomatic COVID-19.

Strengthening preparedness in the Asia–Pacific Region through knowledge

Assoc. Prof. Wirichada Pan-ngum is part of SPARK (Strengthening Preparedness in the Asia-Pacific Region through Knowledge), an international consortium aimed at strengthening preparedness in the Asia-Pacific region through knowledge. She is a training partner coordinator and has since recruited 6 students from the Asia Pacific region to undertake the Department's Masters in Biomedical Health and Informatics program. These scholarships were funded through SPARK.

Assoc. Prof. Wirichada Pan-ngum (last on the right) with SPARK Group

Renovated research facilities

To further improve research and teaching capabilities, the Department renovated it facilities and equipped them with advanced but user-friendly technologies and devices. Departmental staff can now operate their activities independently and more efficiently.

INNOVATION, TRANSLATION, SOCIAL IMPACT

mHealth: mobile application for investigating dengue infection

The Department is involved in the development of mHealth, a mobile application-based reporting and investigating system for dengue infection. The mHealth covers information up to household level, significantly improving disease surveillance and reporting by enabling real-time data collection and geospatial mapping. Moreover, mHealth provides important and timely information for policymakers on which areas are becoming dengue hot-spots and need more action, attention, and resource allocation. The application is undergoing testing by public-health personnel in Chonburi Province.

The Department is in collaboration with Mahidol University's Faculty of Information and Communication Technology, BIOPHICS, and MOPH for this project.

Biomedical and Health Informatics Programs

The BHI programs of the Department, which are delivered completely online, provide students with the flexibility to continue their studies while working. Most BHI students work for government and public health sectors in their countries. BHI students will be able to share and apply their learning in their work related to public-health informatics and epidemiology.

Orientation Day for new BHI students, 19 August 2023

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Jaranit Kaewkungwal was appointed Professor in Statistics while Dr. Podjanee Jittamala was promoted to Associate Professor.

Ms. Chotima Charusabha and Ms. Ketsaraporn Thongpakdee were promoted to Research Officer Senior Professional Level.

VISITING/ADJUNCT PROFESSORS

The Department hosted Visiting Professors Prof. Lisa White from Oxford University and Assoc. Prof. Daniel Parker from the University of California, Irvine. They were involved in teaching and supervising students.

HONORS AND AWARDS

Assoc. Prof. Direk Limmathurosakul was included in Mahidol University's Top 1% Researchers for the year 2023.

DEPARTMENT OF TROPICAL NUTRITION AND FOOD SCIENCE

Assoc. Prof.
Pattaneeya Prangthip
Head

The Department of Tropical Nutrition and Food Science is dedicated to educating and training postgraduate students, conducting high-quality research, and providing nutritional knowledge and laboratory services related to nutritional disorders. The Department focuses on two main research areas: tropical nutrition and food science. In tropical nutrition, they investigate malnutrition issues, obesity, dyslipidemia, coronary heart disease, osteoporosis, and epigenetics in vulnerable groups. Additionally, they explore the effects of genetic and protein changes on nutritional status and research natural products and medicinal plants with various beneficial properties, such as anti-cholangiocarcinoma, mosquitocidal, anti-HIV, and anti-obesity effects. In food science, their studies encompass food microbiology, especially probiotics, and the application of glycosidase enzymes in agriculture and the food industry. Staff members are also involved in lecturing, advising, and reviewing scientific projects at various institutions.

FACTS AND FIGURES 2023

5	8	12	6	6	1
Academic Staff	Support Staff	Publications	Honors and Awards	Students	Graduates

> The Department focuses on two main research areas: tropical nutrition and food science.

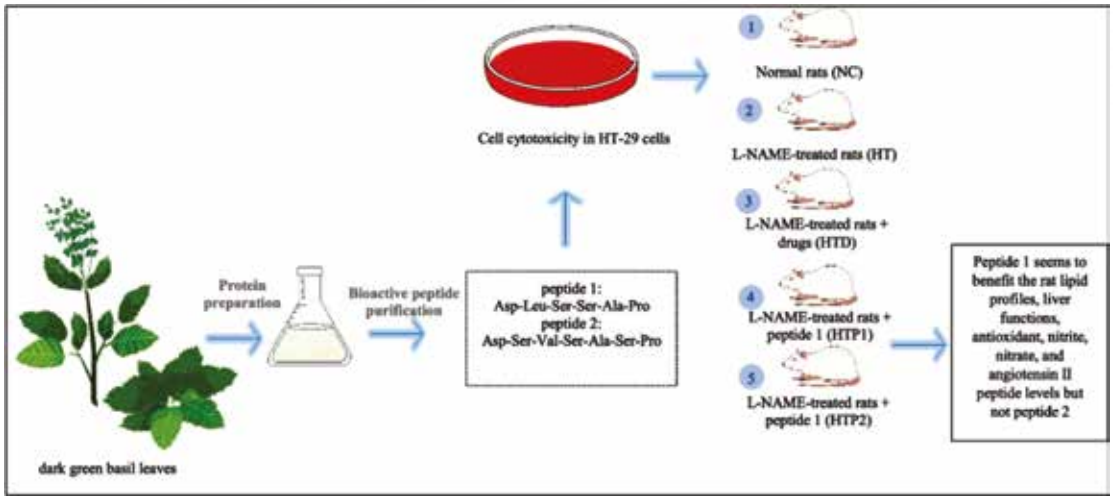
RESEARCH FOCUS

- Cancer biology
- Community health
- Non-communicable diseases
- Therapeutics for fish diseases

RESEARCH HIGHLIGHTS

Potential antihypertensive activity of novel peptides from green basil leaves

A study by Assoc. Prof. Pattaneeya Prangthip, published in BMC Complementary Medicine and Therapies, explored new antihypertensive peptides from green basil leaves. Two peptides were identified: one with high angiotensin-converting enzyme inhibition (peptide 1) and another with antioxidant activity (peptide 2). When tested on rats with induced hypertension, peptide 1 showed benefits for lipid profiles, liver function, and antioxidant levels, indicating potential vasodilation effects.



Assoc. Prof. Pattaneeya Prangthip and team conduct blood tests

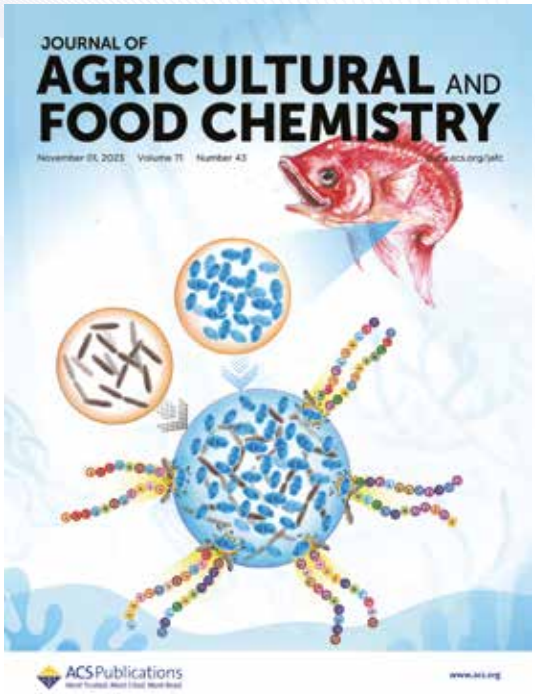
The interaction of dietary pattern and gene polymorphism on Type 2 diabetes

Assoc. Prof. Pattaneeya and her team are also conducting a project investigating the interaction of dietary patterns and gene polymorphisms on Type 2 diabetes. They meticulously conduct blood tests and comprehensive food recall interviews among Bangkok residents to uncover the link between eating habits, genetic factors, and Type 2 diabetes. Their work serves as an important reminder for people to prioritize their health and embrace lifestyles that foster wellness, empowering the community to take care of their health journey.

Effective control of *Aeromonas* infections in aquaculture

Assoc. Prof. Dumrongkiet Arthan's research, published in the Journal of Agricultural and Food Chemistry, explores the efficacy of cocultures of *Enterococcus faecium* and *Aeromonas veronii* in producing bacteriocin-like substances against *Aeromonas* bacteria. Lactic acid bacteria (LAB) isolated from Red sea bass showed antimicrobial activity against *Aeromonas* strains from Nile tilapia. *Enterococcus faecium* MU8 exhibited the highest antimicrobial activity when cocultured with *Aeromonas veronii*. Bioactive substances with molecular weights below 1.0 kDa were identified, with thirteen peptides showing anti-*Aeromonas* activity. This research suggests that *E. faecium* MU8 cocultured with *Aeromonas veronii* could be effective in controlling *Aeromonas* infections in aquaculture, especially in Nile tilapia. The publication was featured on the front cover, emphasizing its significance among selected publications in 2023.

Dr. Dumrongkiet also provided academic services to increasing health literacy in Thai-Myanmar community at Samut Sakhon and Ratchaburi, with support from Thai Health Promotion, Thailand.



Co-cultures of the lactic acid bacteria Enterococcus faecium MU8 and Aeromonas veronii, the pathogen isolated from Nile tilapia, can secrete bacteriocin-like substances (BLS), exhibiting anti-microbial activities against Aeromonas. The purified BLS contains 13 peptides, which may be attributed to their anti-Aeromonas activity.

New cycloheptapeptides from *Mallotus spodocarpus*

Dr. Wittaya Panvongsa and his team have isolated and characterized three new cycloheptapeptides, named mallotumides A-C, from *Mallotus spodocarpus*. Through thorough spectroscopic analysis, including NMR and MS techniques, they determined the structures of these compounds. Dr. Panvongsa conducted cytotoxicity assessments and found that mallotumides A-C exhibited significant cytotoxicity against various cancer cell lines, with IC50 values ranging from 0.60 to 4.02 nM. Moreover, mallotumides 1 and 2 demonstrated dose and time-dependent cytotoxic effects against hypopharyngeal carcinoma (FaDu) and

Dr. Witaya Panvongsa (third from right) at the JITMM 2023.

keratinocyte (HaCaT) cell lines, with IC50 values lower than those of cisplatin, a standard drug for head and neck cancer treatment. This discovery highlights the potential of these natural compounds for further development as promising anticancer therapeutics.

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Dumrongkiet Arthan was promoted to Associate Professor in 2023.

HONORS AND AWARDS

The laboratories of the Department of Tropical Nutrition and Food Science were awarded at MU Safety Day 7 on 28 April 2023 at Prince Mahidol Hall, Mahidol University for passing occupational safety evaluations by Mahidol University. The Vitamins Laboratory passed the Peer Evaluation, while the Laboratory for Determination of Vitamins using High Performance Liquid Chromatography (HPLC) and Biochemical Laboratory passed the evaluation criteria for ESPReL Checklist.

On June 28 2023, Ms. Namfon Ekkason received the “TropMed Plastic Waste Battle 2023” award from the Faculty of Tropical Medicine, Mahidol University.

DEPARTMENT OF TROPICAL PATHOLOGY

Prof. Parnpen Viriyavejakul
Head

The Department of Tropical Pathology comprises three units, the Diagnostic Pathology Unit, the Electron Microscopy Unit and the Tissue Culture and Immunocytochemistry Unit. The Department focuses on teaching, research and academic services. Teaching focuses on integrating pathology for postgraduate students. Research interests are comprehensive, extending through pathogenicity, pathology, biology and immunology of diverse tropical diseases and various non-communicable diseases. The Department's histopathology facility offers routine histology services for specimen diagnosis and microscopic analysis of tissues for researchers. The Department is equipped with both transmission- and scanning electron-microscopes for high resolution images to investigate the detailed structure of cells, tissues, organelles and macromolecular complexes. Tissue and cell culture laboratories explore the biology, function and responses of tissues and cells to external agents.

FACTS AND FIGURES 2023

5	4	15	14	1	5	2
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> The Department focuses on teaching, research and academic services.

RESEARCH FOCUS

- Pathogenesis and pathology of malaria, helminths, psoriasis, and non- communicable diseases
- Therapeutics for psoriasis
- Molecular biology of malaria and non- communicable diseases
- Community health for microsporidia

ON-GOING RESEARCH

Several ongoing research projects related to the focus area include investigating adjuvant therapy for severe malaria mortality, led by

Prof. Parnpen Viriyavejakul and funded by Mahidol University Mini-Research Cluster (MU-MiniRC). Another project, also led by Prof. Parnpen, explores mitochondrial processes during malaria infection, supported by New Discovery and New Frontier research funding.

Assoc. Prof. Sumate Ampawong leads a study on natural therapeutic forms for psoriasis treatment, funded by the National Science Research and Innovation Fund (NSRF). Additionally, Assoc. Prof. Yaowapa Maneerat examines the association between gut microbiome, blood biomarkers, and coronary heart disease risk, supported by New Discovery and New Frontier research funding.

Assoc. Prof. Yaowapa and Ms. Pattarasuda Puasri investigate gene profiling related to the immune response to *Gnathostoma spinigerum* larvae, funded by a DAAD scholarship and a Research Grant from the Faculty of Tropical Medicine.

Assoc. Prof. Urai Chaisri explores the effects of formaldehyde exposure on DNA damage in the buccal tissues collected from several hospitals. This finding potentiates the development of biomarker(s) for occupational exposure to formaldehyde.

Dr. Tachpon Techarang investigates the multi-functional roles of S100 protein expression in an experimental model of cerebral malaria.

SERVICES

Histopathological and electron–microscopy services

The Department offers comprehensive histopathological services for both clinical diagnosis and research purposes. This includes the production of high-quality paraffin-embedded sections stained with hematoxylin and eosin, as well as specialized stained sections to highlight specific tissue components and etiologic agents. The Department also provides electron microscopy services, specimen preparation techniques for both transmission electron microscopy (TEM) and scanning-electron microscopy (SEM) samples. They also facilitate access to cutting-edge TEM and SEM instruments, ensuring advanced services in electron microscopy.

Staff and students of the Department of Tropical Pathology

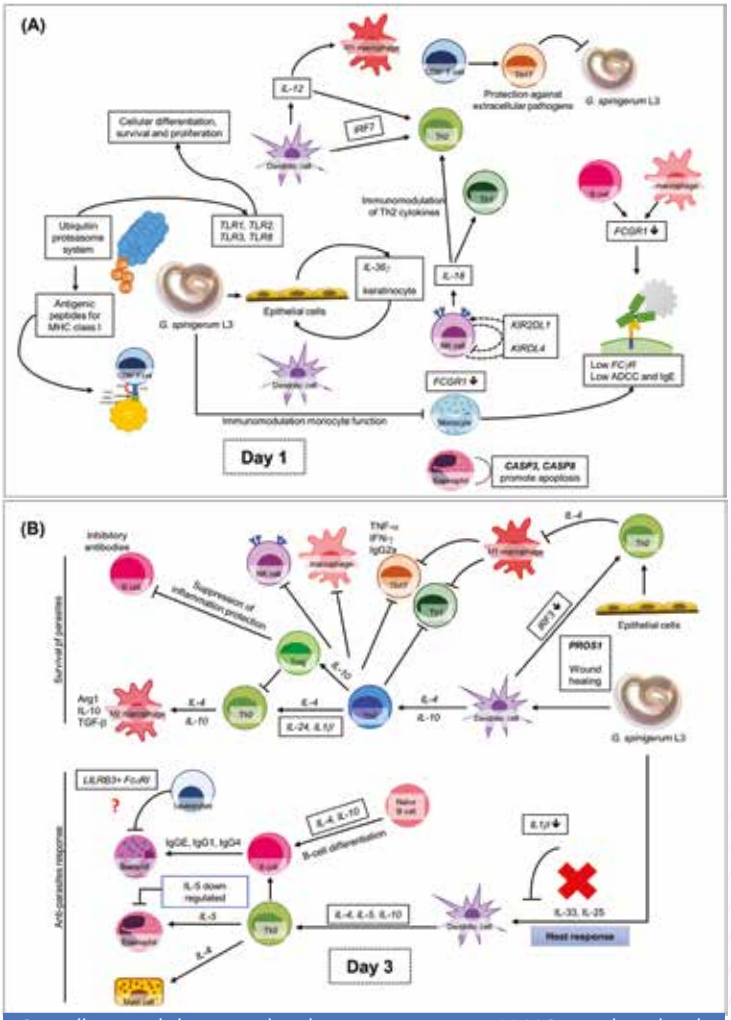
RESEARCH HIGHLIGHTS

Sericin coated thin polymeric films reduce keratinocyte proliferation via the mTOR pathway and epidermal inflammation through IL17 signaling in psoriasis rat model

Therapeutic forms are crucial in treating psoriasis, aiding in plaque resolution and skin repair. Silk fibroin's biocompatibility, strength, flexibility, and adhesive properties make it ideal for combining with anti-psoriatic agents like silk sericin. Assoc. Prof. Sumate Ampawong evaluated sericin-coated polymeric films (ScF) made from silk fibroin in an imiquimod-induced psoriasis rat model. ScF reduce keratinocyte proliferation through the mTOR pathway, deplete β-defensin, caspase-3 and -9, TNF-α, CCL-20, IL-1β, IL-17, TGF-β, and Wnt expressions, and lower S100a14 mRNA level. Hematology data confirmed the safety of these biomaterials, offering a promising therapeutic option for psoriasis treatment. This study was published in Scientific Reports.

Regulation of immune response against third–stage *Gnathostoma spinigerum* larvae by human genes

Assoc. Prof. Yaowapa Maneerat and Ph.D. student Ms. Pattarasuda Puasri investigated whether *G. spinigerum* third-stage larvae (L3) produce extracellular vesicles (EVs), and human gene profiles related to the immune response against the larvae. They found that L3 produce



Overall up- and down-regulated gene expression in PBMC co-cultured with G. spinigerum third stage larvae (L3) at days 1 and 3. (Puasri P, et al. Front Immunol. 2023).

EV-like particles and release them into excretory-secretory products. Genotypic findings during their 3-day observation revealed that most significant gene expressions were related to T and B cell signaling, driving T helper-2 cells related to chronic infection, immune evasion of the larvae, and the pathogenesis of gnathostomiasis. Further in-depth studies are necessary to clarify gene functions in the pathogenesis and immune evasion mechanisms of infective larvae. They published their work in Frontiers in Immunology.

The assessment of formaldehyde exposure for health surveillance

Assoc. Prof. Urai Chaisri conducted a study aimed at defining suitable biomarkers for formaldehyde exposure. The study involved 13 hospitals, with participants categorized into high-exposure (49 samples) and low-exposure (49 samples) groups. Buccal tissue was collected from each participant to study DNA damage. The results indicated that DNA damage and formaldehyde concentration in the workplace were higher in the high-exposure group than the low-exposure group ($P \leq 0.05$). The study suggests that DNA damage assessed by comet assay (single-cell gel electrophoresis) is associated with formaldehyde exposure, proposing it as a biomarker for occupational exposure to formaldehyde and a tool for health surveillance.

HONORS AND AWARDS

Ms. Wilanee Dechkhajorn, Scientist at the Department of Tropical Pathology, in collaboration with Assoc. Prof. Panan Ratthawongjirakul of Chulalongkorn University, received the National Research Award: Invention Award, Consolation Prize for her invention “TB naked eye detection kit (MTB Strip)” from the National Research Council of Thailand (NRCT), during the Thailand Inventors’ Day 2023 on 2-6 February 2023, Bangkok International Trade & Exhibition Centre (BITEC), Thailand.

Ms. Wilanee Dechkhajorn (right) on the day of the Award Ceremony

DEPARTMENT OF TROPICAL PEDIATRICS

Assoc. Prof.
Kriengsak Limkittikul
Head

Since 1974, the Department of Tropical Pediatrics has advanced teaching and research in tropical pediatrics. Its 250 research outputs are contributing significantly to the field's knowledge base. This dedication to sharing knowledge has been evident through various channels, including academic publications and participation in teaching programs, such as the Diploma in Tropical Medicine and Hygiene, the Master in Clinical Tropical Medicine (Tropical Pediatrics), and the Doctor of Philosophy in Clinical Tropical Medicine.

The Department's commitment extends to academic publications, teaching programs, and short courses for pediatric care expertise. They also provide high-quality medical services for children in tropical regions.

As the Department reflects on its journey, we take pride in our faculty, staff, and student contributions and remain dedicated to advancing research, education, and clinical care for the well-being of children in tropical regions.

FACTS AND FIGURES 2023

6	9	4	4	1	3	1
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> Since 1974, the Department of Tropical Pediatrics has advanced teaching and research in tropical pediatrics.

RESEARCH FOCUS

- Dengue vaccines
- Dengue diagnosis and pathogenesis
- Hepatitis B vaccines
- RSV vaccines
- Epidemiology of hepatitis B, enterovirus, and RSV
- Diversity of dengue virus and enterovirus

Academic staff of the Department of Tropical Pediatrics with students of the M.C.T.M.(Trop. Ped.) Program

ON-GOING RESEARCH

Assoc. Prof. Chukiat Sirivichayakul is leading a Phase III trial assessing the efficacy and safety of a Tetravalent Dengue Vaccine (TDV) in children aged 4-16, supported by Takeda.

Assoc. Prof. Kriengsak Limkittikul leads a multinational study on Respiratory Syncytial Virus (RSV) disease in infants, which is being funded by Sanofi.

Asst. Prof. Supawat Chatchen oversees three studies: surveillance of hand, foot, and mouth disease (HFMD) in Bangkok kindergartens, whole genome sequencing of dengue viruses (Serotype 1-4), and climate-sensitive viral diseases in schools in Thailand. The projects are supported by FF67, SLF, and the Rockefeller Foundation, respectively.

SERVICES

Medical service at the out-patient department of the Hospital for Tropical Diseases

TROP-PED Diagnostic Center (TDC): PRNT for Dengue virus laboratory service

revealed an investigation of the immune response to Zika virus (ZIKV) and Dengue virus (DENV). They found that combining IgA and IgM tests improved ZIKV detection, especially in recent ZIKV cases with past DENV exposure. DENV triggered longer-lasting immune responses. Certain cytokines differed between the two viruses, suggesting IL-4 for ZIKV and IL-10 for DENV as potential diagnostic markers. Combining IgA and IgM tests with specific cytokines holds promise for earlier and more accurate diagnosis of ZIKV and DENV.

RESEARCH HIGHLIGHTS

Potential protective effect of dengue NS1 human monoclonal antibodies against dengue and Zika Virus infections

Asst. Prof. Dr. Supawat Chatchen and collaborators from other departments revealed that DENV NS1-specific HuMAbs demonstrate therapeutic effects against both Dengue (DENV) and Zika (ZIKV) viruses through the complement pathway. Furthermore, it has been observed that both DENV and ZIKV NS1 trigger endothelial dysfunction, resulting in vascular permeability in vitro. This project, part of a PhD in Tropical Medicine, involves multidisciplinary collaboration.

Potential biomarkers for early ZIKV and DENV infections in hyperendemic regions, Thailand

Assoc. Prof. Kriengsak and Asst. Prof. Dr. Supawat, in a collaborative study from other departments,

The expression of circulating hsa−miR−126−3p in dengue−infected Thai pediatric patients

A study by departmental researchers published in Pathogens and Global Health explored hsa-miR-126-3p involved in pathogenesis as a potential biomarker for dengue virus (DENV) infection. The findings showed a low level of circulating miR-126-3p during the febrile phase in dengue fever (DF) patients. However, no correlation was observed between CmiR-126-3p levels and dengue severity. This study is a collaborative effort with the Department of Microbiology, Faculty of Pharmacy, Mahidol University.

Diversity of human enterovirus Co−circulations in five kindergartens in Bangkok between July 2019 and January 2020

Enterovirus A71 (EV-A71) and coxsackievirus clusters have been detected in both symptomatic

and asymptomatic cases, with two instances of a single clone causing an infection cluster (EV-A71 C1 and CV A6). Diverse genotypes co-circulate among children in kindergartens, serving as reservoirs for emerging genotype variants. This collaborative project involves multiple departments from the Faculty of Tropical Medicine, as well as the Faculty of Science at Prince of Songkla University and MORU. The study was published in Viruses.

Health education as part of informed consent for the research project on human enterovirus co-circulation in five kindergartens in Bangkok.

HONORS AND AWARDS

Assoc. Prof. Kriengsak Limkittikul was named Exemplary Teacher on "Health Sciences" by Mahidol University Faculty Senate for the year 2023, on 2 March 2024 in Prince Mahidol Hall, Mahidol University.

Assoc. Prof. Kriengsak Limkittikul received the Exemplary Teacher on "Health Sciences" Award by Mahidol University Faculty Senate for the year 2023 from the President of Mahidol University, on 2 March 2024 in Prince Mahidol Hall, Mahidol University

CENTERS OF EXCELLENCE

The Faculty has four Centers of Excellence – BIOPHICS, the Vaccine Trial Center, CEAR, and the Center of Excellence for Malaria Research which is composed of 3 malaria research units – CMRU, DRUM and MVRU. On the following pages there are more details about each center and unit, including their areas of focus and recent achievements.

CENTER OF EXCELLENCE FOR BIOMEDICAL AND PUBLIC HEALTH INFORMATICS (BIOPHICS)

Mr. Amnat Khamsiriwatchara
Director

BIOPHICS is the Faculty's Center of Excellence for Biomedical and Public Health Informatics. Since its establishment in 1998, it has served as a regional center of data management for clinical research studies and health informatics projects. Following 3C working principles: commitment, compliance, and collaboration, BIOPHICS has provided data management services to more than 100 projects, ranging from phase I-IV clinical trials, observational studies, disease registry and surveillance at both national and international levels. BIOPHICS was a key player in the success of new drug and vaccine developments, particularly during public-health emergencies, such as the H1N1 2009 and COVID-19 pandemics.

FACTS AND FIGURES 2023

2	6	6	15	1	1	0
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> BIOPHICS is the Faculty's Center of Excellence for Biomedical and Public Health Informatics. Since its establishment in 1998.

SERVICES

- Data management
- Statistical analysis
- Public health informatics
- Data visualization
- Health information systems and applications development (website and mobile platform)
- Training and consultation

HIGHLIGHTS

mHealth: mobile application for malaria elimination

mHealth is a mobile application-based reporting and digital surveillance system for Thailand's malaria elimination program developed by BIOPHICS. The mHealth application covers information up to household level, significantly improving disease surveillance and reporting by enabling real-time data collection and geospatial mapping. Through mHealth, it was found that malaria cases are increasing, particularly in the western part of Thailand, Thai-Myanmar border, where armed conflict in Myanmar is on-going.

mHealth provides important and timely information for policymakers on which areas are becoming malaria hotspots and that need more action, attention, and resource allocation. mHealth is a crucial element in the malaria-elimination effort of Thailand.

Updating Thailand's malaria digital surveillance system

Some tasks for malaria elimination program have been reassigned from MOPH's Division of Vector-Borne Disease to the Ministry of Interior. This change meant that the operations of the electronic malaria information system (eMIS) will be transferred to the local administration level. Therefore, BIOPHICS is entrusted to update or redesign eMIS into a more user-friendly system so new users will be able to adapt to the system easily. BIOPHICS will also support technological transfer and capacity building for its new users.

ASEAN Vaccine Information and Management System (VIMS)

In collaboration with the National Vaccine Institute (NVI), BIOPHICS was tasked to develop an online information and management system for vaccines in ASEAN. Equipped with data visualization and analysis tools, the system can collect, store, and

User interface of VIMS

update the database of all vaccines that are available in Southeast Asia, including vaccines that are undergoing clinical trials at all phases conducted by public, private, and international organizations.

One of the aims for this platform is to be a vaccine information-sharing and reference tool for ASEAN countries and a source for potential collaboration between countries for their immunization programs. ASEAN countries can use the data from VIMS for policy decision making and vaccine management at a national level.

25 Years of BIOPHICS: Turning data into actionable wisdom

BIOPHICS celebrated its 25th anniversary last year. To commemorate this important milestone, BIOPHICS held a hybrid event on 19 March 2024 in the Maegraith Conference Hall, 8th Floor of the Chalermprakiat 60 Year Building, Faculty of Tropical Medicine, Mahidol University.

The 25-Year Data Journey of BIOPHICS was revisited through a video presentation. Past and present collaborators of BIOPHICS attended the event and delivered their congratulatory remarks. Moreover, former directors of BIOPHICS; Prof. Emer. Dwip Kitayaporn and Prof. Jaranit Kaewkungwal participated in the Panel Talk "The Transformation of Clinical Data Management from Past to Present".

Reflecting on the greatest achievement of BIOPHICS over the years, Mr. Amnat Khamsiriwatchara shared "The greatest achievement of BIOPHICS is not the awards or recognition, it is the long-lasting and generational impact of our work on public health and how our projects can be sustained and transferred to others. Each of our projects is different and tackles various public-health issues. We can use data into something useful. Our work contributes to saving lives."

As the current director of BIOPHICS, Mr. Amnat's goal in the future is to find new leaders to continue their work with the same vision and foundation.

CENTER OF EXCELLENCE FOR ANTIBODY RESEARCH (CEAR)

Assoc. Prof.
Pongrama Ramasoota
Director

The Center of Excellence for Antibody Research (CEAR), was founded at FTM in 2009. The goal of the Center is to produce therapeutic products against infectious diseases. The Center currently employs 6 full-time staff. It is equipped with state-of-the-art facilities, including the equipment necessary for Single-cell Antibody Production, industrial-scale antibody purification, cell-sorter flow cytometry, viral culture, bio-sensor and real-time PCR.

FACTS AND FIGURES 2023

4	5	3	6	4	2	1
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> The Center of Excellence for Antibody Research (CEAR), was founded at FTM in 2009.

RESEARCH FOCUS

- Therapeutic human antibody against dengue virus
- Therapeutic human antibody against Sars Cov 2 virus
- Therapeutic human antibody against rabies virus
- Anti-aging and regenerative medicine

Staff of CEAR

ON-GOING RESEARCH

CEAR is working on several research projects focusing on antibody development.

Dr. Sujitra Keadsanti received a funding from MOTIP to produce novel human TRIM21-RBCC conjugated single chain variable fragments (scFvs) targeting Dengue Nonstructural (NS1) protein.

Assoc. Prof. Pannamthip Pitaksajjakul are conducting three projects funded by the Faculty. One focuses on characterizing anti-NS1 recombinant human IgG antibodies produced from mammalian cells, another explores plant-based anti-NS1 recombinant human IgG antibodies, and the third involves establishing stable CHO-K1 cells for producing recombinant human IgG antibodies specific to dengue virus NS1 protein. Assoc. Prof. Pannamthip is also developing a murine animal model for studying the therapeutic efficacy of anti-dengue human monoclonal antibodies. This project is supported by the Center of Excellence for Medical Biotechnology.

Assoc. Prof. Pongrama Ramasoota is spearheading the commercialization of the Neutralizing human monoclonal antibody (NhuMAb) against dengue virus (DENV). Since 2021, the 1st version NhuMAb clone # 54 that can neutralize DENV during the first 7 days of infection, was licensed by Advy company. However, after the first 7 days of infection, DENV-produced Nonstructural (NS1) protein accumulates in patients. NS1 can cause severe disease, such as plasma leakage and thrombocytopenia, that can last for the next 7 days or more. Since the 1st version NhuMAb clone # 54 could neutralize DENV but cannot stop severe disease caused by NS1, the 2nd version NhuMAb clone # 8 has been developed by our research team. This NhuMAb clone # 8 could not only neutralize DENV but also reduced plasma leakage and severe dengue, and eliminated viral infected cells *in vitro*. NhuMAb clone # 8 has been patented (Thailand Patent # 2301000031) and needs further development as clone # 54. Recently, the Japan Shangri-LA Medical Holding (JSMHD) Company in Tokyo, Japan signed a MOU for the commercialization of this Novel 2nd version therapeutic NhuMAb against DENV. JSMHD introduced a new Investor, Aditxt, which is a company on the NASDAQ stock market, USA. Aditxt has already signed a NDA contract with Assoc. Prof. Pongrama and will submit the licensing contract to Mahidol University on 3 May 2024. In that, Aditxt plans to invest 12 Million US$ for the development of this novel NhuMAb that can treat DENV completely in both viremic (1st 7 days) and non-viremic severe phases (2nd 7 days).

Assoc. Prof. Pongrama with Dr. Apissada are also developing therapeutic monoclonal antibodies against the rabies virus using immunized phage-displayed libraries, funded by the National Research Council of Thailand - Research and Researchers for Industries (NRCT-RRi).

RESEARCH HIGHLIGHTS

Potential protective effect of dengue NS1 human monoclonal antibodies against dengue and Zika virus infections

Assoc. Prof. Pannamthip Pitaksajjakul, and Dr. Rochanawan Sootichote discovered that DENV NS1-specific HuMAbs demonstrate therapeutic effects against both Dengue (DENV) and Zika (ZIKV) viruses through the complement pathway. Furthermore, it has been observed that both DENV and ZIKV NS1 trigger endothelial dysfunction, resulting in vascular permeability in vitro.

Production of antibody drug from plant cells to reduce severe symptoms of dengue

CEAR, Mahidol University expands the production of antibody drug(s) from plant cells to reduce severe symptoms of dengue fever virus. CEAR is collaborating with “BaiyaPhytopharm” company, affiliated with Chulalongkorn University. By inserting the DNA of the desired dengue fever antibody gene into plant cells, it becomes feasible to produce antibody drugs for treating dengue fever in large quantities efficiently. This innovative approach saves space and reduces costs significantly. Currently, this innovation is undergoing commercialization, with plans for production in a GMP-standard factory.

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Surachet Benjathummarak was promoted to Research Assistant (Senior Professional Level).

HONORS AND AWARDS

Assoc. Prof. Pongrama Ramasoota, Assoc. Prof. Pannamthip Pitaksajjakul, and Dr. Rochanawan Sootichote received the “Leave a Nest Award” at the Tech Planter Asia Final 2023 DEMO DAY on 26 August 2023, in Cyberjaya, Malaysia, for their passionate presentation and promising technology in the hopes that they can contribute to the changing world by Advancing Science and Technology for Global Happiness. At the same event, Assoc. Prof. Pongrama Ramasoota received the Euglena Award. Tech Planter is an acceleration program that aims to nurture startups in Japan and Southeast Asia.

No	Team Name	Project Title	Category
	Round 1: Philippines & Indonesia Teams (13:30 - 14:20)		
1	BioCoat-Z	Nanoclay particle film for cacao pods	Agri-tech
2	EnviSense	Customizable groundwater monitoring system	Eco-tech
3	Architobiotech Indonesia	Coralove and Xero-Fertilizer	Bio-tech
4	Habibi Garden	The Future of Agriculture by Habibi Garden	Agri-tech
	Round 2: Singapore & Vietnam Teams (14:35 - 15:25)		
5	Nanomatics	Maximizing Value Recovery from Waste	Deep-tech
6	Enlpasun	High Energy Dosimetry	Med-tech
7	Allemó	Thermal Energy Storage for Agriculture Drying	Agri-tech
8	SHOES	Shoes on Mud	Agri-tech
	Round 3: Malaysia & Thailand Teams (15:35 - 16:25)		
9	Entomal	Waste to Wealth in 7 days with Black Soldier Flies	Eco-tech
10	My Myracle	Postbiotic-The 5G Biotic	Bio-tech
11	FleKARs	Large-area Flexible Polymer with Antifouling Robust Micro-structure for Marine and Medical Applications	Deep-tech
12	Therapeutic Antibodies	Therapeutic Antibody, the Ideal Treatment Against Dengue Virus	Med-tech

Assoc. Prof. Pongrama Ramasoota received a certificate of appreciation at the Thailand Inventors and Innovators Association on 28 October 2023 for presenting his work on antibody drug to treat dengue fever.

CLINICAL MALARIA RESEARCH UNIT (CMRU)

Prof. Srivicha Krudsood
Head

The CMRU specializes in the clinical care of malaria patients, including severe malaria pathophysiology, hematology profiling, exploring new combination therapies and dosing strategies. The major challenges it seeks to address are the complications of malaria treatments due to glucose-6-phosphate dehydrogenase (G6PD) deficiency in patients and improvements in patient care through early detection. The work of CMRU informs and influences the national malaria elimination policy and strategy of Thailand.

FACTS AND FIGURES 2023

3	4	9	3
Academic Staff	Support Staff	Publications	Research Projects

RESEARCH FOCUS

- Clinical care management
- Pathogenesis of severe malaria
- G6PD deficiency
- Antimalarial drugs pharmacodynamics
- Antimalarial drugs dosing regimen
- Malaria elimination

> The work of CMRU informs and influences the national malaria elimination policy and strategy of Thailand.

Staff of CMRU

HIGHLIGHTS

Evaluation of malaria detection function of new diagnostic products in Thailand

In collaboration with the National Center for Global Health and Medicine, Japan, and the Ministry of Public Health, Thailand, Prof. Srivicha Krudsood is assessing the malaria-detection ability of new diagnostic products in Thailand, currently in Phase 1 and Phase 2. The results will inform recommendations for product implementation and potential policy changes. The goal is to improve malaria detection and support malaria elimination efforts in Thailand.

Prevalence of gametocytes in *P. falciparum* malaria patients in Thailand

CMRU researchers and collaborators investigated the prevalence of gametocytes in *P. falciparum* malaria patients in Thailand from 2001 to 2020. They found that gametocyte carriers were prevalent even in low-transmission areas. Risk factors included age (15-24 years), Karen ethnicity, prolonged fever before admission (> 7 days), low hemoglobin levels (≤ 8 g/dL), and certain parasite densities. The study highlighted the increasing incidence of imported malaria cases and supports the use of primaquine to clear gametocytes, crucial to interrupting transmission and achieving malaria elimination in Thailand by 2025.

Antimalarial drug toxicity: an updated brief review

Assoc. Prof. Noppadon Tangpukdee and colleagues published a review on antimalarial drug toxicity, highlighting the importance of developing new antimalarial medications for prevention and treatment, alongside current vector-control strategies. The review provided an updated overview of the toxicity profiles and adverse effects associated with current antimalarial drugs globally, aiming to guide clinicians in making informed treatment decisions.

SOCIAL IMPACT

Impact on the current malaria treatment guideline

The CMRU, led by Prof. Srivicha Krudsood, is instrumental in introducing single-dose tafenoquine as a new and improved treatment for *P. vivax* liver-stage malaria. The tafenoquine single-dose regimen reduces the risk of low or non-compliance among patients, in contrast with the primaquine 14-day regimen. However, as with primaquine, patients with G6PD deficiency can experience complications when treated with tafenoquine. Therefore, G6PD testing prior to drug delivery is crucial. Years of clinical trials conducted with CMRU generated important information for an updated guideline for malaria treatment and contributed to the improvement of G6PD point-of-care diagnostics.

Malaria management consultancy and training

Prof. Srivicha Krudsood serves as a consultant for many hospitals in Thailand in cases related to the clinical management of malaria. She offers virtual consultations for hard-to-reach hospitals or when travel is not available. She is involved in training in several national and international courses on the management of malaria and has served as a speaker in workshops organized by hospitals, universities, and other health institutions in Thailand, presenting the current national treatment guidelines for malaria.

CMRU and the Faculty, as a WHO Collaborating Centre for the Clinical Management of Malaria, organized the 21st Virtual International Training Course on Management of Malaria, held 21-25 August 2023.

HONORS AND AWARDS

Prof. Polrat Wilairatana was included in Mahidol University's Top 1% Researchers and Stanford University's World's Top 2% Scientists list.

DRUG RESEARCH UNIT FOR MALARIA (DRUM)

The Drug Research Unit for Malaria (DRUM) was established in February 2017, focusing on anti-malarial research, including their modes of action and their mechanisms of resistance. DRUM works in collaboration with the Excellent Center for Drug Discovery (ECDD) at the Faculty of Science, Mahidol University, where high-technology instrumentation for pharmaceutical research and drug discovery are centralized. The facilities at DRUM and ECDD are a unique joint resource and thus allow high-throughput screening assays for antimalarial drug discovery. In addition, DRUM works in collaboration with the Rathod Lab at the Department of Chemistry, University of Washington, in Seattle, USA, and the NIH South Asia MESA-ICEMR to understand the evolution of drug resistance in malaria parasites.

Dr. Rapatbhorn Patrapuvich Rathod
Head and Principal Scientist

FACTS AND FIGURES 2023

1	4	3	5	3
Academic Staff	Support Staff	Publications	Research Projects	Students

RESEARCH FOCUS

- Malaria drug discovery
- Malaria biology and diversity
- Molecular biology of malaria

ON-GOING RESEARCH

Dr. Rapatbhorn Patrapuvich Rathod holds key roles in several malaria research projects. As a Co-Principal Investigator (PI), she contributes to projects such as "Combinatorial Bioorganometallic Compounds against Malaria," funded by ETH Zurich through a Swiss RPG-ASEAN program, and "Synthesis of chloroquine hybrid molecules as next-generation antimalarial agents," supported by Monash University. Dr. Rapatbhorn also serves as the Director and PI of the Mahidol

> The Drug Research Unit for Malaria (DRUM) was established in February 2017, focusing on anti-malarial research, including their modes of action and their mechanisms of resistance.

University – University of Washington (UW) Malaria Research Initiative Program, and acts as a Pre-Erythrocytic Stage Expert Consultant for the Malaria Evolution in South Asia (MESA) project, funded by the NIH International Center of Excellence for Malaria Research (ICEMR). Furthermore, she leads the project "A Robust Plasmodium vivax Hypnozoite Model for Anti-relapse Activity Assay," funded by Mahidol University's New Discovery and Frontier Research initiative.

SPECIAL ACTIVITIES HIGHLIGHTS

DRUM participated in research training provided by the US NIH MESA-South Asia ICEMR at Goa Medical College and Hospital and the National Institute of Malaria Research (NIMR) in Goa, India, from 10-31 May 2023. Dr. Rapatbhorn and DRUM staff, Mr. Tachin Khulmanee and Mr. Phongthon Kanjanasirirat, led a hands-on workshop focusing on transmission models of malaria parasites.

RESEARCH HIGHLIGHTS

Dr. Rapatbhorn Patrapuvich Rathod received a Swiss RPG-ASEAN grant as a Co-PI in collaboration with Dr. Angelo Frei from the University of Bern, Switzerland (PI), and Dr. Ang Chee Wei from Monash University Malaysia (also a Co-PI). This collaboration aims to explore combinatorial bioorganometallic compounds that can curb the spread of resistant parasites as well as being effective against different stages of the parasite life cycle. This is a proof-of-concept study for a potential ongoing collaboration on the exploration of the organometallic chemical space for novel antimalarial drugs. As this space has not been explored systematically so far, there is enormous potential for novel discoveries.

Dr. Rapatbhorn Patrapuvich Rathod presented collaborative work with the MESA-South Asia ICEMR at the NIH International Centers of Excellence for Malaria Research 2023 workshop held in Bhubaneswar, Odisha, India, on 13-14 February 2023.

Dr. Rapatbhorn Patrapuvich Rathod presents her work on stage

VISITING/ADJUNCT PROFESSORS

Prof. Pradip Rathod and Dr. John White of the Department of Chemistry, University of Washington, served as Visiting Professors at DRUM under the MU-UW Malaria Research Initiative Program.

Left to right: Dr. John White, Mr. Tachin Khulmanee, Dr. Rapatbhorn Patrapuvich Rathod, Prof. Pradip Rathod, and Dr. Rimi Chakrabarti (from UW).

MAHIDOL VIVAX RESEARCH UNIT (MVRU)

Research Prof.
Jetsumon Prachumsri
Director

MVRU's mission is to accelerate malaria elimination through research. To achieve their goal, staff strive to fill important knowledge gaps in *P. vivax* biology and provide platforms for the development of new diagnostic and therapeutic tools. MVRU staff work both in the field and in the lab to discover, create, and validate new ways to fight malaria.

Staff of MVRU

FACTS AND FIGURES 2023

6	13	20	14	1	25	1
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students	Graduates

> MVRU's mission is to accelerate malaria elimination through research.

RESEARCH FOCUS

- Molecular biology of vivax malaria
- Epidemiology and diagnosis of malaria
- Genomics and transcriptomics for malaria
- Malaria vaccine development
- Artificial Intelligence for malaria research
- Molecular biology and diagnosis of scrub typhus

ON-GOING RESEARCH

Research Prof. Jetsumon Prachumsri leads numerous projects related to further understanding *P. vivax* malaria, vaccine development, and malaria elimination in Thailand. Her projects are supported by some of the largest funding agencies in the world, such as the US National Institutes of Health (NIH) and the Wellcome Trust. She is a Principal Investigator for the Southeast Asia Malaria Research Center: ICEMR and *Plasmodium Vivax* Volunteer Infection Studies in Thailand: MIST Project, to name just a few.

MVRU conducts mass blood and vector surveys for malaria in several hot-spot areas along the Thai-Myanmar border.

Dr. Sirasate Bantuchai is supported by the National Research Council of Thailand for the STS Forum Young Leader Program.

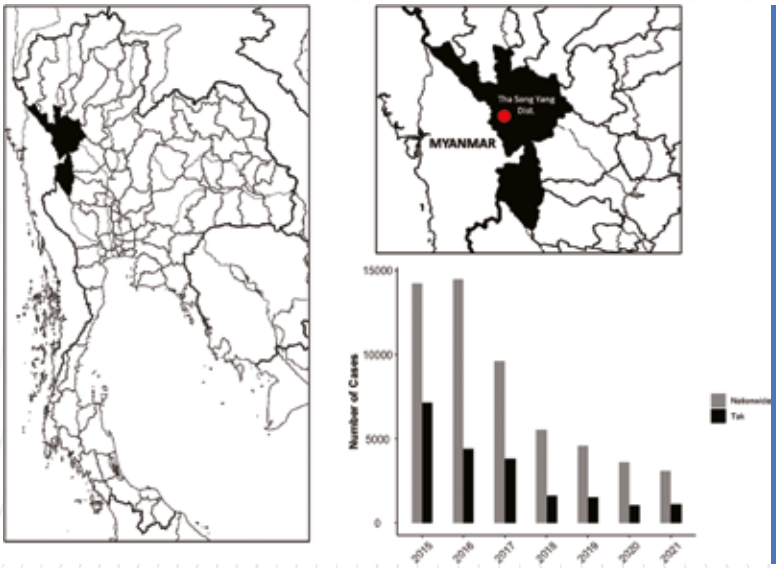
Dr. Parsakorn Tapaopong is working on two projects, "Genomic Epidemiology of Malaria Parasite in Thailand" and "Antigenic Diversity of Malaria Vaccine Candidates for *Plasmodium vivax* in Myanmar", both funded by the NIH.

With a Fundamental Fund type, Basic Research Fund, Dr. Nawapol Kunkeaw is developing a potent Pvs25 mRNA vaccine to block the transmission of *P. vivax* malaria.

RESEARCH HIGHLIGHTS

Genetic diversity and molecular evolution of *P. vivax* duffy binding protein and merozoite surface protein 1 in northwestern Thailand

Dr. Parsakorn Tapaopong, Research Prof. Jetsumon Prachumsri, and Assoc. Prof. Dr. Wang Nguitragool analyzed the genetic diversity and population structure of *Plasmodium vivax* in a highly endemic area of Thailand using amplicon sequencing of



The location of Tak Province, in northwestern Thailand, the greatest hot-spot for malaria in the country. The area marked with a red dot is Tha Song Yang District, which is the site for sample collection. The bar chart represents the number of malaria incidents caused by P. vivax in Tak Province and nationwide from the year 2015 to 2021.

70 samples from 2015 to 2021. They sequenced two gene regions, pvmsp1 and pvdbp, identifying 16 and 40 unique haplotypes, respectively. They found higher nucleotide and haplotype diversity in pvmsp1 than pvdbp, suggesting pvmsp1 is under stronger balancing selection due to host immunity. Despite this, a decrease in genetic diversity was observed over time, likely due to successful control measures. These results provide insights into the genetic diversity of P. vivax, informing vaccine development and future monitoring efforts.

Development of multiplexed ddPCR — AmpSeq for *Plasmodium genomics* characterization

Another work of the researchers is the development of a high-throughput assay to investigate the genetic structure of multiple loci in malaria parasites, including *P. vivax, P. falciparum,* and *P. knowlesi*, utilizing advanced molecular techniques, such as digital droplet PCR and nanopore sequencing.

Development of Potent Pvs25 mRNA vaccine to block transmission of *P. vivax*

For vaccine development, Dr. Nawapol Kunkeaw and Research Prof. Dr. Jetsumon Sattabongkot are utilizing Pvs25 nucleoside-modified mRNA vaccine that induces potent and long-lasting transmission-blocking immunity.

Fundamental Funding awards to help advance vaccine and diagnostic development for vivax malaria

Research Prof. Jetsumon Prachumsri acquired two Fundamental Funding type, Basic Research Fund from Mahidol University for her projects "Development of a new RNA vaccine against *Plasmodium vivax* that enters the liver" and "Finding biomarkers for use in detecting people with the hypnozoite stage of *Plasmodium vivax* in the liver: Year 2".

Malaria epidemiology studies of MVRU are associated with questionnaires to identify groups of people who are under highest risk of malaria infection

INNOVATION, TRANSLATION, SOCIAL IMPACT

Dr. Sirasate Bantuchai won the Early Career Innovator Award at the Mahidol-Oxford Translational Innovation Partnership (MOTIP) Pitching Competition 2023. His project is entitled "Novel Universal Rapid Diagnostic Test for Human and Emerging Zoonotic Malaria". MOTIP offers funding to PhD students and Post-docs who have promising translational research ideas.

ACADEMIC AND SUPPORT STAFF PROMOTION

Dr. Parsakorn Tapaopong and Dr. Pyae Linn Aung were promoted to Researcher Level 1.

HONORS AND AWARDS

Research Prof. Jetsumon Prachumsri was among Mahidol University's Top 1% Researchers in 2023.

VACCINE TRIAL CENTRE

The Vaccine Trial Centre (VTC) of the Faculty of Tropical Medicine, Mahidol University, serves as a clinical facility for testing newly developed vaccines requiring evaluation in human volunteers. The Centre was established in February 1984, with full operation achieved by September-October 1986, and the first admission of volunteers to the ward on 3 November 1986. At present, the VTC functions as a clinical trial research site for the HIV Vaccine Trials Network (HVTN), supported by the National Institutes of Health (NIH), including Vaccine Trial Centre -Mahidol University Clinical Research Site (VTC-MU-CRS), the Military HIV Research Program Clinical Trials Unit (MHRP-CTU), HVTN, and the Division of AIDS (DAIDS). With a vision to become a global leader in vaccine research and development in HIV vaccine and other infectious diseases including emerging and reemerging vaccines, the VTC is steadfast in its mission to excel in conducting high-quality clinical research and development.

Prof. Emer.
Punnee Pitisuttithum
Acting Head

FACTS AND FIGURES 2023

8	23	9	8	3	1
Academic Staff	Support Staff	Publications	Research Projects	Honors and Awards	Students

RESEARCH FOCUS

- Dengue vaccines
- HIV/AIDS vaccines
- Chikungunya vaccines
- COVID-19 vaccines
- UTI, MPOX, pneumococcal vaccines
- Drug for the prevention of dengue

> The Centre was established in February 1984, with full operation achieved by September-October 1986.

ON-GOING RESEARCH

Prof. Emeritus Punnee Pitisuttithum is leading multiple clinical trials. She is conducting a randomized, double-blind evaluation of late boost strategies for HIV prevention and overseeing a Phase 3 clinical trial on the efficacy, immunogenicity, and safety of the 9vHPV vaccine for preventing oral persistent infection with HPV types 16, 18, 31, 33, 45, 52, or 58 in adult males.

Prof. Emeritus Punnee is also involved in a Phase II/III trial assessing the safety and immunogenicity of the BBV87 Chikungunya vaccine in healthy subjects aged 12 to 65 years. Together with Assoc. Prof. Weerapong Phumratanaprapin and Assoc. Prof. Viravarn Luvira, she is investigating immune responses to an inactivated recombinant Newcastle disease virus vaccine expressing SARS-CoV-2 spike protein, which was locally manufactured in Thailand in collaboration with national and international partners.

Prof. Emeritus Punnee and Assist. Prof. Sant Muangnoicharoen are examining immune responses and boosting effects in adults previously vaccinated against COVID-19. Prof. Emeritus Punnee and Assoc. Prof. Weerapong Phumratanaprapin are conducting a Phase I/II study to evaluate the safety and immunogenicity of the GPO seasonal quadrivalent influenza vaccine in healthy Thais to fulfil the national mission on vaccine security by the National Vaccine Institute, Thailand. The above-mentioned projects are funded by various organizations, including The Henry M. Jackson Foundation for the Advancement of Military Medicine, Merck Inc, IVI, Thailand Research Fund Senior Research Scholarships, and the Thailand Government Pharmaceutical Organization (GPO).

Asst. Prof. Sant is leading a Phase 2 trial assessing the efficacy and safety of two dose regimens of JNJ-64281802 to prevent dengue infection, funded by Janssen Research & Development.

Assoc. Prof. Chayasin Mansanguan is overseeing a randomized, double-blind, placebo-controlled Phase 3 study evaluating the efficacy, safety, and immunogenicity of vaccination with ExPEC9V for preventing invasive extraintestinal pathogenic *Escherichia coli* disease in older adults with a history of urinary tract infection, funded by J&J.

SPECIAL ACTIVITIES AND HIGHLIGHTS

World AIDS Day

On World AIDS Day, the Vaccine Trial Centre held a seminar to share new HIV knowledge with the National Community Advisory Board in the Chalermphrakiat Conference Room, Faculty of Tropical Medicine, Mahidol University on November 30, 2023.

Forest restoration activities

On January 7, 2023, VTC with 80 volunteers participated in forest restoration activities by seed bombing and bird-house building at Phachi River Wildlife Sanctuary, Ban Kha, Ratchaburi Province.

Prof. Emeritus Punnee receives the TRF Senior Research Scholar Award by the National Research Council of Thailand

Prof. Emeritus Punnee Pitisuttithum receives the Research Award from Her Royal Highness Princess Maha Chakri Sirindhorn on 21 April 2023, in the Napalai Room, Dusit Thani Pattaya Hotel, Chonburi.

HONORS AND AWARDS

Prof. Emeritus Punnee Pitisuttithum received three prestigious accolades in 2023. She was awarded Researchers of the Year, Lifetime Achievement by Mahidol University on 2 March 2023, the Research Award on 21 April 2023 by the Royal College of Physicians of Thailand, and the TRF Senior Research Scholar Award on 7 August 2023 by the National Research Council of Thailand (NRCT).

Prof. Emeritus Punnee accepts the Researchers of the Year, Lifetime Achievement 2023 Award from Prof. Banchong Mahaisavariya, President of Mahidol University

COLLABORATIONS

International academic collaboration is central to the work at the Faculty. There are currently five international organizations or units hosted, across a range of research and activity areas. The following pages describe the work of each collaboration and their highlights and impacts in 2023.

MAHIDOL OXFORD TROPICAL MEDICINE RESEARCH UNIT (MORU)

Prof. Nicholas Day
Director

The MORU Tropical Health Network, which hosts the 'Thailand Wellcome Africa and Asia Programme', conducts targeted clinical and public health research that aims to discover and develop appropriate, practical, affordable interventions that measurably improve the health of people living in resource-limited parts of the world.

Patient-centred research is the core of MORU's activities. Geographically dispersed across 8 research units and 60 clinical research sites across Asia and Africa, their integrated, highly collaborative, flexible network lets MORU address global and regional health problems such as drug resistant infections, malaria, febrile illness, medicine quality, and critical illness.

MORU staff in Bangkok

> These selected highlights are arranged below according to MORU's 2020-2025 themes.

HIGHLIGHTS

These selected highlights are arranged below according to MORU's 2020-2025 themes.

Theme 1. Defining and understanding big public health problems

Epidemiology and diagnostics

The MORU Southeast Asian Community Trials Network (SEACTN) aims to understand febrile illness incidence and causes in remote poor communities in Southeast Asia. In 2023, SEACTN, along with Village Health Worker (VHW) networks and Primary Care Centers,

South and Southeast Asian Community Trials Network (SEACTN)

recruited 83,000 patients with unknown febrile illnesses across Laos, Thailand, Myanmar, and Bangladesh. These studies, combined with verbal autopsies, hospital-based studies, and household surveys, are informing the design of new interventions to be tested in community-based cluster-randomized clinical trials.

In 2023, MORU collaborated with regional governments on population and disease epidemiology and mapping. Efforts included village mapping in Bangladesh, malaria receptivity mapping in Thailand, climate-related malaria studies in Laos, and analyzing malaria outbreaks and elimination activities in Cambodia.

MORU developed village-level malaria incidence mapping methods in Bangladesh and analyzed routine malaria data in Bangladesh, Cambodia, Laos, Myanmar, Thailand, and Vietnam for health ministries.

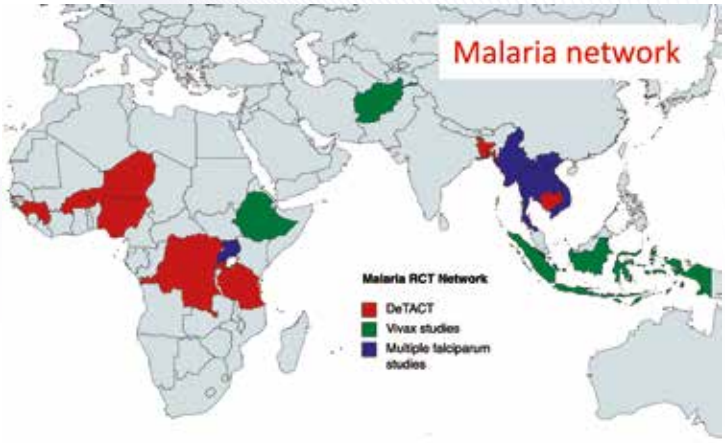
They also supported the UN's SALB program by creating historical changes tables for Africa.

The MORU Laboratory Network developed new diagnostics, including a CRISPR-based rapid test for melioidosis with Chiang Mai University, potentially saving lives by enabling faster diagnosis and treatment.

Antimicrobial drug resistance

A Clinically Oriented Antimicrobial Resistance Network (ACORN) operated 19 sites in nine African and Asian countries, implementing bacterial whole-genome sequencing and capturing over 30,000 clinical infections and nearly 1,000 bloodstream infections. Collaboration with Singapore's ADVANCE-ID team continues.

MORU and the Thai Ministry of Public Health improved understanding of AMR in Thai hospitals. They showed that the AutoMated tool for Antimicrobial Resistance Surveillance System (AMASS) helps hospitals analyze data for immediate action. AMASS is now being rolled out across Thailand.



The MORU malaria clinical research network 2023

Antimalarial drug resistance

MORU's well-established malaria Genetic Reconnaissance Network (Genre) has identified through genetic barcoding an outbreak of artemisinin-resistant parasite strains in Southern Laos [9], caused by rapid clonal expansion of a multidrug-resistant strain (LAA1) carrying the kelch13 Arg539Thr (R539T) mutation. LAA1 replaced kelch13 Cys580Tyr (C580Y) mutants resistant to dihydroartemisinin-piperaquine (KEL1/PLA1) as the dominant strain. These results are communicated routinely to the National Malaria Control Programmes for action.

Theme 2. Patient care

Community health

MORU has a holistic and multi-faceted approach to improving community health. For example, in Tanzania, follow-up continued in 2023 on the Star Homes randomised controlled trial (RCT) in Tanzania. This study aims to estimate the health benefits of improvements in housing on child health.

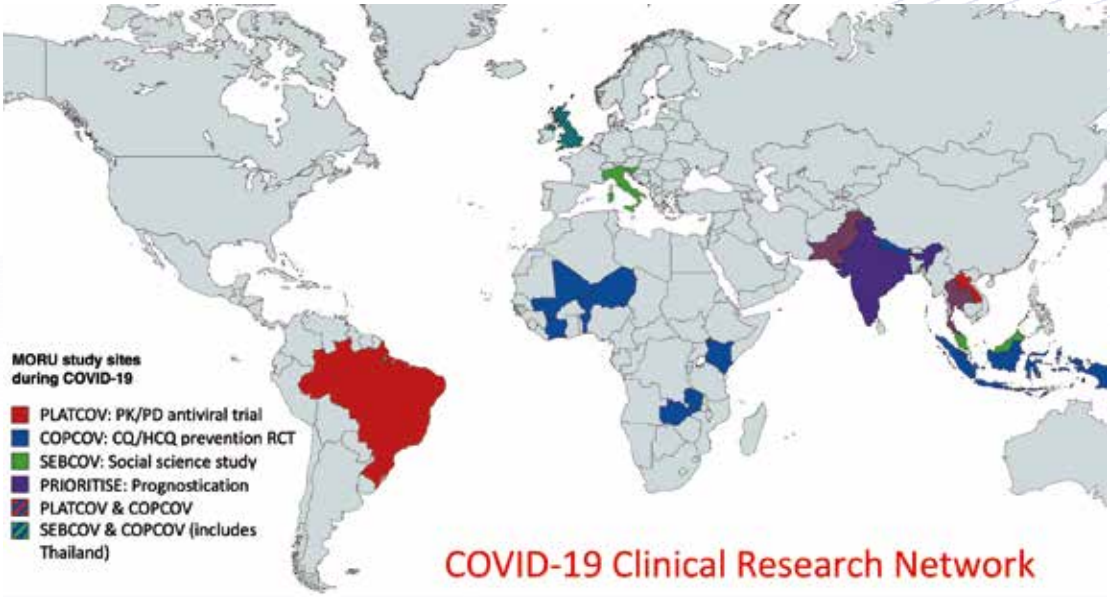
In Cambodia, the final analysis from their decade-long pneumococcal conjugate vaccine impact study (PCV) was published, showing that in Cambodia PCV13 vaccine effectiveness was 28% against hypoxic pneumonia and 31% again chest X-ray confirmed pneumonia.

Clinical trials

Randomized clinical trials (RCTs) are central to MORU's work, providing essential evidence for healthcare improvements. In 2023, MORU completed eight RCTs, initiated ten, and continued twelve ongoing ones, enrolling 14,623 participants. Additionally, 2,008 participants joined non-RCT interventional studies, and 159,987 joined observational studies. Highlights include:

- A multisite trial in Africa and Asia on Triple Artemisinin Combination Therapies (TACTs) will conclude in 2024 as part of the DeTACT project. Fosun Pharma developed a fixed-dose TACT, to be tested in four African countries starting in 2024.
- The INTREST trial, the largest RCT for severe scrub typhus treatment in India, showed that combining parenteral azithromycin and doxycycline is superior to using either alone

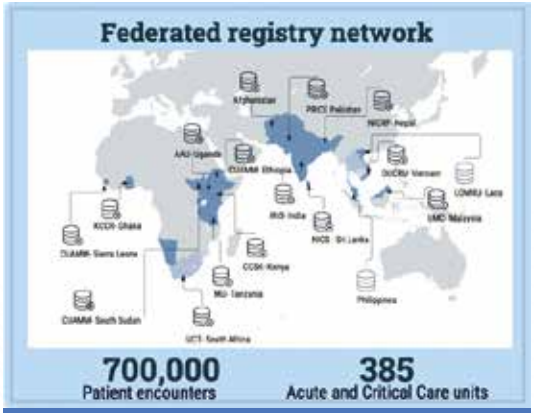
The world's largest study of COVID-19 chemoprevention, COPCOV, enrolled 4,646 participants across 11 countries in a double-blind placebo-controlled trial and showed that chloroquine or hydroxychloroquine prophylaxis provided moderate protection against COVID-19.



MORU COVID-19 clinical research network 2020-2024

Critical illness

At the other end of the patient care pathway from community health, MORU has built, with support from Wellcome Innovations Flagship funding, a Critical Care Network across 8 Asian countries. The aim of this network is to support interventions that improve patient outcomes in the rapidly developing LMIC critical care sector. During the pandemic, the Network enabled LMIC recruitment into several important international COVID-19 RCTs. In 2023, the Network was expanded with ICUs in 7 participating countries in Africa.

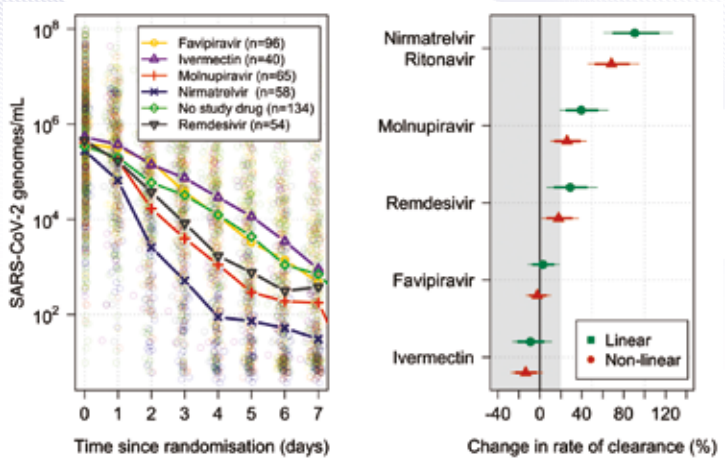


MORU Critical Illness Network

Pharmacometric studies

MORU focuses on pharmacology and pharmacometrics to optimize anti-infective treatments, especially for children, pregnant women, and the malnourished, where drug data are often lacking.

For example, MORU's research led the WHO to recommend a higher dose of parenteral artesunate (3 mg/kg) for children under 20 kg. However, the US FDA recently suggested a lower dose (2.4 mg/kg). In 2023, MORU's pharmacokinetic modeling of 80 children in the Democratic Republic of Congo showed that the lower dose often results in inadequate drug exposure, arguing against the FDA's recommendation.



Results from the PLATCOV study on antiviral activity against SARS-CoV2

In 2023, MORU expanded its pharmacometric approach to platform trials for new or repurposed anti-infectives. The PLATCOV study, the world's largest on COVID-19 antiviral pharmacometrics with over 1,500 patients, found that ivermectin and favipiravir offer no benefit, fluoxetine provides minor benefit, while molnupiravir, remdesivir, and ritonavir-boosted nirmatrelvir are effective. This study also improved antiviral assessment methods. MORU is now applying this approach to other respiratory infections like influenza and RSV.

Theme 3. Maternal and child health

Pregnancy

The over three decades of antenatal and obstetric experience from SMRU, MORU's research unit on the Thai-Myanmar border, continues to bear fruit. Analysis of a carefully and prospectively collected multi-decade cohort has shown that corticosteroids given before delivery significantly decrease neonatal mortality in early preterm babies in a low-resource setting where ventilation is unavailable. Another analysis produced the first detailed description of severe malaria in pregnancy in Asia, demonstrating the role of vital organ dysfunction on maternal and fetal mortality and morbidity.

Neonatal care

SMRU, on the Thai-Myanmar border, has instituted a programme to improve outcomes for babies born in low-resource settings. In a 10-year review, they showed that the introduction of evidence-

SMRU's new home – the new Borderland Health Foundation building in Mae Ramat, Tak Province

based care in special-care baby units in SMRU, mortality was reduced by 68% and 53% in very and moderately preterm neonates, respectively.

Child health

In Cambodia and Laos, their SPOT SEPSIS and associated studies have evaluated the performance of existing clinical severity scores in children with acute respiratory infections and the added prognostic value of host biomarkers in childhood pneumonia.

Theme 4. Malaria elimination

Single low-dose primaquine (SLDP) reduces falciparum malaria transmission but is underused due to safety concerns. In Uganda and the Democratic Republic of Congo, an RCT confirmed the safety of age-dosed SLDP in children with glucose-6-phosphate dehydrogenase deficiency infected with P. falciparum, supporting its wider use in Africa.

The MORU Network has shown the crucial role of village malaria workers (VMWs) in malaria elimination and the importance of expanding their roles to village health workers (VHWs) to prevent reintroduction. Africa, facing greater transmission and disease burden, can learn from Asia's VMW experience.

A study published in 2023 demonstrated the potential of ivermectin for malaria elimination by showing its activity against *P. falciparum* and interactions with antimalarial drugs.

MORU completed a study on the immunogenicity of the R21 malaria vaccine in Thai adults. This vaccine, prequalified by WHO for African children, could reduce transmission if widely used. A large trial combining R21 with mass drug administration will start in the Bangladeshi hill tracts in 2024, with preparations and community engagement already underway.

In low-transmission areas of Southeast Asia, malaria often spreads from forest workers to their communities. An RCT published in 2023 showed good efficacy of antimalarial chemoprophylaxis for forest goers.

To eliminate vivax malaria, safe radical cure drugs are needed. Currently, primaquine and tafenoquine are used. In 2023, MORU initiated a trial to test a higher dose of tafenoquine and is developing a pediatric formulation of primaquine for correct dosing.

The Nuffield Department of Medicine's MORU-FTM Clinical Trials Unit (CTU) is running clinical trials of a revolutionary malaria vaccine candidate, R21/ Matrix-M™

MALARIA CONSORTIUM

Prof. Leo Braack
Senior Specialist: Vector Control,
Malaria Consortium Asia

Established in 2003, the Malaria Consortium is one of the world's leading non-profit organizations specializing in the prevention, control and treatment of malaria and other communicable diseases among vulnerable populations. The Consortium's mission is to save lives and improve health in Africa and Asia, through evidence-based programs that combat targeted diseases and promote universal health coverage. Malaria Consortium's Head Office is based in London, UK. In Asia, they have offices in Cambodia, Myanmar and Thailand, working on a wide range of public-health issues, including malaria, arboviruses, cervical cancer, newborn care and childhood illness for conflict areas in Myanmar, vector control capacity strengthening in Asia-Pacific countries. Malaria Consortium also supports a new generation of emerging medical entomologists through the Dr. Sylvia Meek Master's Degree Scholarship implemented by Mahidol University's Faculty of Tropical Medicine.

In 2023, the Malaria Consortium and the Faculty of Tropical Medicine signed a Memorandum of Agreement (MoA) anew to continue their fruitful collaborations.

> The Consortium's mission is to save lives and improve health in Africa and Asia, through evidence-based programs that combat targeted diseases and promote universal health coverage.

Dean Assoc. Prof. Weerapong Phumratanaprapin and Prof. Leo Braack during the MoA Signing Ceremony between the Faculty of Tropical Medicine, Mahidol University and the Malaria Consortium

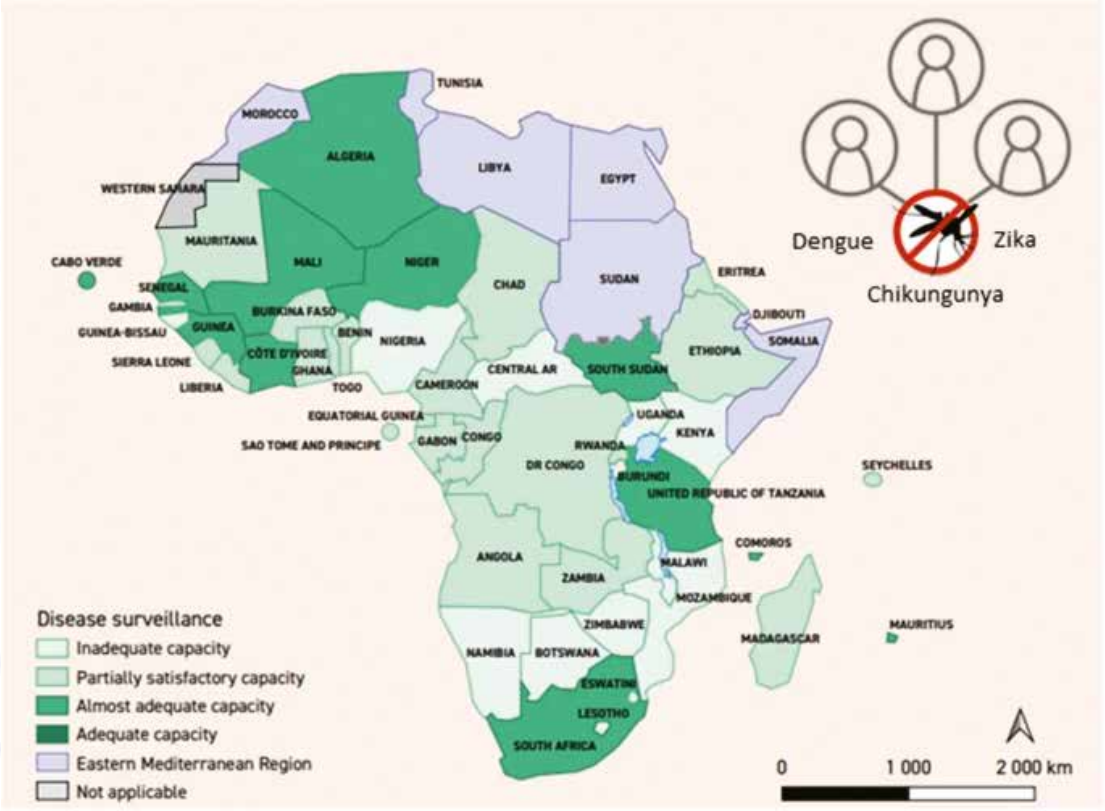
RESEARCH FOCUS

- Epidemiology of malaria, dengue, scrub typhus, COVID-19 and other diseases
- Malaria diagnosis, treatment, and vaccines
- Malaria and dengue vector control
- Dengue diagnosis
- Community health for COVID-19
- Biology and diversity of tropical diseases

RESEARCH HIGHLIGHTS

Developing African arbovirus networks and capacity strengthening in arbovirus surveillance and response: findings from a virtual workshop

Prof. Leo Braack and team published their report in *Parasites and Vectors,* presenting the key findings of a virtual workshop, held in September 2022, and organized by the "Resilience Against Future Threats through Vector Control (RAFT)" research consortium. The workshop aimed to identify priorities for advancing arbovirus research, network and capacity strengthening in Africa. The workshop discussed key findings from a recent WHO/TDR survey across 47 African countries, highlighting significant shortfalls in arbovirus outbreak preparedness, surveillance, and control capacity. It emphasized the importance of networking and identified research gaps and priorities for capacity strengthening in arbovirus surveillance.



Based on total scores: inadequate capacity, 0 < score < 50%; partially satisfactory capacity, 50% ≤ score < 70%; almost adequate capacity, 70% ≤ score < 90%; adequate capacity, 90% ≤ score ≤ 100%.

Map extracted from: *Surveillance and control of arboviral diseases in the WHO African region: assessment of country capacities. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO.*

(a) Collecting samples of indigenous fish species in the wild for conducting mosquito predation and breeding studies, (b) a school of fish, Puntigrus partipentazona, (c) counting mosquito larvae for fish feeding.

Indigenous "ecological equivalents" of guppy fish in Thailand for predation in *Aedes* larvae in water containers

Donors are reluctant to fund mass rearing and release of guppies due to this being an exotic, introduced species with potential for impact on indigenous species. Mrs. Shobiechah Wulandhari from Malaria Consortium and collaborators from Mahidol University Department of Medical Entomology conducted mosquito predation and breeding experiments on two indigenous species, *Rasbora urophthalmoides* and *Puntigrus partipentazona* to compare findings against guppies *Poecilia reticulata*. Findings are currently being analyzed and written up for publication.

Species composition, seasonal abundance, and biting behavior of malaria vectors in rural Conhane village, Southern Mozambique

The aim of this study was to determine the species diversity and abundance, biting activity, and *Plasmodium* infectivity of *Anopheles* mosquitoes in southern Mozambique. Human landing catches were performed monthly between December 2020 and August 2021. Eight *Anopheles* species were identified among the 1802 anophelines. *Anopheles gambiae sensu lato* (s.l.) were the most abundant (51.9%) and were represented by *Anopheles quadriannulatus* and *Anopheles arabiensis*. *Anopheles funestus* s.l. represented 4.5%. The biting activity of *An. arabiensis* was more pronounced early in the evening and outdoors, whereas that of *An. funestus sensu stricto* (s.s.) was more intense late in the night.

Survey of West Nile and Banzi Viruses in Mosquitoes, South Africa, 2011–2018

Malaria Consortium researchers collected >40,000 mosquitoes from 5 provinces in South Africa during 2011-2018 and screened for zoonotic flaviviruses. We detected West Nile virus in mosquitoes from conservation and periurban sites and potential new mosquito vectors; Banzi virus was rare. Our results suggest flavivirus transmission risks are increasing in South Africa.

INNOVATION, TRANSLATION, SOCIAL IMPACT

Vector surveillance capacity strengthening in Asia Pacific

As the Implementing Agent for the APMEN Vector Control Working Group, Malaria Consortium plans and implements a range of vector-control trainings and information-sharing to NMCP's and research institutions in the Asia-Pacific, including in-person courses, online courses, exchange visits, webinars and research support.

Last year, Malaria Consortium organized the 4th International Malaria Vector Surveillance for Elimination Course in Salatiga, Indonesia on 3-15 July 2023.

South–South learning exchange: Building networks for arbovirus preparedness

Outbreaks of *Aedes*-borne arboviral diseases, including dengue and chikungunya, are increasing in frequency and scale across Africa where there is limited knowledge and preparedness to respond to these global threats. As part of the Resilience Against Future Threats (RAFT) research consortium, the Malaria Consortium organized two South-South learning visits between vector control experts from Africa, Asia and Latin America to facilitate an exchange of knowledge and experience on managing arboviral diseases. These visits aimed to strengthen the capacity of African vector control programs to anticipate emerging threats and enhance strategic preparedness through increased awareness, technical understanding and operational knowledge of national arboviral vector control programs.

Two South-South learning exchanges, in Thailand (2022) and Cameroon (2023), were organized by Malaria Consortium between senior level representatives and scientists from African, Asian and Latin American arboviral control programs. Participants conducted laboratory and field visits, met with local vector-borne disease councils and collaborated to discuss successes and barriers to vector-borne disease control implementation.

Group photo of national nominees from 5 countries attending the APMEN Vector Surveillance training course in Indonesia in July 2023, organized by the Malaria Consortium

SILOM COMMUNITY CLINIC @TROPMED

Dr. Andrey Borisov
CDC DHP Thailand Program Director

Silom Community Clinic opened in late 2005 as a healthcare research center devoted to addressing the HIV epidemic, particularly the high burden of HIV in gay, bisexual and other men who have sex with men (MSM), and transgender women (TGW). In November 2013, the clinic moved to its current location at the Hospital for Tropical Diseases and thus was renamed to Silom Community Clinic @TropMed (SCC @TropMed). SCC @TropMed has been recognized as a global HIV-research leader. The clinic is based on the model of integrating the provision of preventive care serving MSM and TGW populations with conducting groundbreaking HIV and STI studies.

SCC@TropMed attributes its success to its longstanding partnerships with the MSM/TGW communities, Thailand Ministry of Public Health (MOPH), the U.S. Centers for Disease Control and Prevention (CDC), the Faculty of Tropical Medicine at Mahidol University, and other academic institutions and partners.

“Silom Community Clinic opened in late 2005 as a healthcare research center devoted to addressing the HIV epidemic, particularly the high burden of HIV in gay, bisexual and other men who have sex with men (MSM), and transgender women (TGW).”

RESEARCH FOCUS

- HIV Prevention (HPTN083 trial and COPE study)
- Biology of HIV (TGWSM study)
- Epidemiology, molecular biology, and novel treatments for gonorrhea (EGASP Project and Zoli study)
- Epidemiology of COVID-19 (COSERO study)

Project team of “Cross-sex Hormone Therapy and the Rectal Mucosa Immune Environment in Transgender Women Study (TGWSM Study)” during Dr. Colleen Kelley, TGWSM Study Principal Investigator, visit to Silom Community Clinic at the Hospital for Tropical Diseases on October 25-26, 2023.

RESEARCH HIGHLIGHTS

Combination HIV Prevention Effectiveness (COPE) study

The COPE study was a community-based implementation study in Bangkok and Pattaya, Thailand. Participants were MSM and TGW aged 18-26 years who reported exchanging sex in the prior 12 months and met PrEP eligibility criteria. The intervention included HIV testing, testing for sexually transmitted infections, provision of condoms with lubricant, and the opportunity to use PrEP at any time. The primary outcome was HIV incidence on PrEP vs. not on PrEP. Secondary outcomes were PrEP initiation and adherence. Findings showed high PrEP uptake, persistence, and adherence, with low HIV incidence when offered in supportive community-based settings. The findings were published in **The Lancet Regional Health - Southeast Asia**.

Enhanced Gonococcal Antimicrobial Surveillance Programme (EGASP) study

In the WHO/CDC global Enhanced Gonococcal Antimicrobial Surveillance Programme (EGASP), SCC @ TropMed collaborated with other clinics in Thailand and around the globe to monitor AMR trends. In the recently published article co-authored by SCC @TropMed's Dr. Andrey Borisov, Ms. Thitima Cherdtrakulkiat, and Ms. Silvina Masciotra, the researchers examined surveillance at two clinical sites in Bangkok, Thailand from 2015–2021. Urethral discharge samples from males with urethral discharge and/or dysuria were Gram-stained, cultured, and ETEST was performed to determine AMR. High susceptibility to ceftriaxone (Thailand's first-line gonorrhea treatment) was found; however, the increasing MICs of ceftriaxone, cefixime, and azithromycin pose a substantial threat. The results highlight the importance of conducting continuous and quality-assured gonococcal AMR surveillance such as the Thai WHO/CDC EGASP, ideally including WGS, to monitor for AMR.

Static images used in the social media campaign for the Combination Prevention Effectiveness (COPE) study for young men who have sex with men and transgender women who exchange sex, Thailand (2018–2020) © Weir et al.

HONORS AND AWARDS

The SCC @TropMed staff received numerous recognitions, including awards from the U.S. Embassy. In the award ceremony in Bangkok in 2023, US Ambassador Robert Codec presented SCC @TropMed staff with the Group Award and Group Customer Service Award. Ms. Wanna Leelawiwat received the Honor Award Certificate, while Dr. Anupong Chitwarakorn, Dr. Parimoke Kerdchantuk, and Dr. Wasin Matsee were presented with the Group Certificate of Appreciation.

Ms. Worrajittanon D., Ms. Khongsom P., Ms. Reansoi P., Ms. Pongthai S., Ms. Na-Pompet S., and Ms. Thongnok S. received the Combined Group Eagle Award and Certificate of Appreciation.

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

Assoc. Prof. Pratap Singhasivanon
Secretary-General/Coordinator

> The Network serves as a focal point in higher education and research in tropical medicine and public health.

SEAMEO TROPMED Network is a regional-cooperation network established in 1966 for education, training and research in tropical medicine and public health under the Southeast Asian Ministers of Education. The Network serves as a focal point in higher education and research in tropical medicine and public health.

HIGHLIGHTS

Regional Workshop" Mapping Extent of Curricular Integration of One Health related Concepts in Basic Education in Southeast Asia"

SEAMEO TROPMED Network, in collaboration with CHEVRON and SEAOHUN, has implemented a pilot project "Promoting One Health Education in the School Setting" in a border school in Thailand. The long-term plan of SEAMEO TROPMED Network is to upscale this project to the Member Countries of SEAMEO. Organizing this Regional Workshop is envisioned to facilitate the upscaling of the One Health Curricular Mainstreaming in the region.

The workshop, held in Bangkok on 22-23 June 2023, aimed to achieve several objectives: identifying existing health-related policies, programs, services, and topics integrated into the curriculum; clarifying One Health (OH) concepts; defining priority integration

topics; discussing challenges of mainstreaming these concepts and proposing solutions; and recommending measures to promote OH education in schools. It brought together 40 participants from diverse member countries and organizations, including the World Organisation for Animal Health (WOAH), UNESCO, the Southeast Asia One Health University (SEAOHUN) consortium, and SEAMEO Science Cluster Centres, along with SEAMEO TROPMED Regional Centres, the SEAMEO Secretariat, and Chevron.

Presentations

Dr. Ronello C. Abila from WOAH discussed the relevance of OH in Southeast Asia and presented the Joint Plan of Action by WHO, WOAH, FAO, and UNEP, highlighting six action tracks for integrating OH education. Ms. Jenelle Babb from UNESCO emphasized the interconnectedness of health, wellbeing, and educational outcomes, advocating for the Health Promoting School (HPS) program. She identified challenges such as crowded timetables, lack of integration guidance for teachers, inadequate age and culturally sensitive materials, and insufficient teacher training.

Prior to the workshop, curriculum experts from the eight countries conducted a pre-workshop country analysis, the results of which were presented during the event. This analysis encompassed existing health-related policies within the Education Ministries, ongoing health programs and services, as well as the needs, issues, and challenges faced by teachers that could influence the integration of One Health into the curriculum. A Guide for the Country Analysis was provided by the SEAMEO TROPMED Network Office. It was found that all eight countries have existing health-related policies, albeit varying in numbers, addressing key issues such as WASH (Water, Sanitation and Hygiene) in Schools, School Health Programs/Health Promoting Schools, School Safety, Prevention of Certain Diseases and Injury, Environmental Education, Drug Prevention, Climate Change, and Disaster Preparedness/Resilience.

In all represented countries, there is no specific policy on OH within the education sector, although some countries have such policies within the health and environment sectors. School health services are available across all countries, varying in coverage and types of services offered, with common services including dental care, basic nursing services, deworming, and health facility referrals. Common topics in the curriculum include Nutrition, Sexual and Reproductive Health (including HIV), and Climate Change. Furthermore, several One Health-related topics, such as hand washing, environmental care, infectious disease prevention (e.g., malaria and dengue), food safety, and pet care, are increasingly being incorporated into the curriculum across most countries.

Breakout Sessions Output

The key challenges identified in integrating OH include the absence of policy support, the need for teacher training to understand OH concepts and develop pedagogical skills, constraints of time and space in the existing curriculum, lack of teaching resources, and weak collaboration across sectors. Priority issues and topics suggested for OH integration, discussed during breakout sessions, include climate change, zoonotic diseases, food literacy and safety, pollution (air, water, soil), and mental health. Integration strategies should consider the specific needs and context of each country, ensuring that the content for each topic is age and grade-appropriate.

The resource material for teachers should be versatile for both online and in-person classes, providing a comprehensive guide for integration. It should contain clear objectives, key content, suggested teaching activities, and assessments for each topic, alongside links to additional resources. The material should accommodate various learning styles to ensure inclusivity and effectiveness. To advance One Health Education, suggested activities include advocacy efforts targeting policymakers and school officials for policy and budgetary support, developing evidence-based policy briefs, identifying champions, and conducting capacity-building initiatives for teachers and officials. Additionally, advocating for inclusion in national plans and forging partnerships with private sectors and relevant stakeholders can further promote One Health Education.

The results of the workshop were presented to the High Officials of the SEAMEO Member Countries during the High Officials Meeting in November 2023.

WORLDWIDE ANTIMALARIAL RESISTANCE NETWORK (WWARN)

The Infectious Diseases Data Observatory (IDDO) exists to promote the reuse of individual participant data across the global infectious disease community. IDDO curates submitted data from many different sources in-house, to produce freely available harmonised datasets, enabling scientists to answer new research questions from existing data.

It also provides the methods, governance and infrastructure to translate clinical data into evidence to improve health outcomes worldwide. IDDO incorporates the pioneering WorldWide Antimalarial Resistance Network (WWARN), a collaborative data-sharing framework that proved it is possible to produce policy-changing scientific evidence from pooling existing data.

The WWARN External Quality Assurance programme works with over 60 laboratories across 30 countries to improve the analysis of antimalarial drug regimens, and enhance the quality of research data output.

Dr. Mehul Dhorda
Head of WWARN External Quality Assurance Programme
Co-Head IDDO Asia Pacific Centre - Thailand (ARC - T)

RESEARCH FOCUS

- Data visualisations (including tracking antimalarial resistance)
- Data governance
- Data platforms for sharing individual patient data for Ebola, COVID-19, Visceral Leishmaniasis, Malaria, Chagas, and soil-transmitted helminth diseases.
- Surveillance and detection of substandard and falsified medical products

> “The Infectious Diseases Data Observatory (IDDO) exists to promote the reuse of individual participant data across the global infectious disease community.”

RESEARCH HIGHLIGHTS

Children with acute malnutrition and malaria: the double burden that increases risk of treatment failure

An analysis of over 11,000 falciparum malaria individual patient data sets has found that acutely malnourished children have a higher risk of reinfections and treatment failures, even when treated with recommended doses of artemisinin-based combination therapies, currently the best malaria treatment available. The malaria parasite clearance was also likely to be longer in these children.

Agnes, surrounded by small children ©Stephan Gladieu / World Bank

Advanced Laser Spectroscopy to detect falsified vaccines

An international consortium of multidisciplinary researchers and specialists, including Medicine Quality researchers at IDDO, has developed a new method to counter the problem of COVID-19 vaccine falsification: the method performs a chemical analysis by shining a laser light into an intact vial of the vaccine.

New meta–analysis finds six month follow–ups miss quarter of visceral leishmaniasis relapses

An analysis of the nearly 30,000 patients in the IDDO library of VL studies found that the disease returned after treatment in up to 4.5% of patients in the Indian subcontinent.

This study demonstrates the power of IDDO's approach – by combining individual patient data from a cohort (malnourished children) rarely included in clinical studies, researchers were able to spot a clear pattern that was otherwise hidden. This study was led by Philippe Guerin, Kasia Stepniewska, and Karen Barnes.

Passengers and commuters in a train station in Mumbai ©Simone D. McCourtie / World Bank

New evidence supports higher dose antimalarial to combat relapsing malaria

An analysis of data from more than 6,800 patients located across 16 countries has supported the need to increase the dose of the antimalarial drug, primaquine, in malaria endemic countries.

Repurposed tests can detect falsified vaccines

Widely available rapid diagnostic tests (RDTs) manufactured to diagnose common infections can be repurposed to detect substandard and falsified (SF) vaccines, a study by IDDO's Medicine Quality Group finds.

HONORS AND AWARDS

Professor Philippe Guérin, IDDO and WWARN's Director, has been awarded the 2023 Bailey K. Ashford Medal for his 'distinguished' work in tropical medicine.

The American Society for Tropical Medicine and Hygiene (ASTMH) President Daniel G. Bausch presented the medal at a ceremony at the Hyatt Regency Chicago, on the opening day of the 72nd annual meeting of the society in October 2023.

Professor Philippe Guérin at the ASTMH 72nd annual meeting

FACILITIES AND SERVICES

Alongside the departments, centers, and collaborations, the Faculty has an important set of facilities and services, for researchers, students and the general public. The following pages give more information on the work and achievements of

BANGKOK SCHOOL OF TROPICAL MEDICINE

Assoc. Prof.
Kriengsak Limkittikul
Deputy Dean for Education

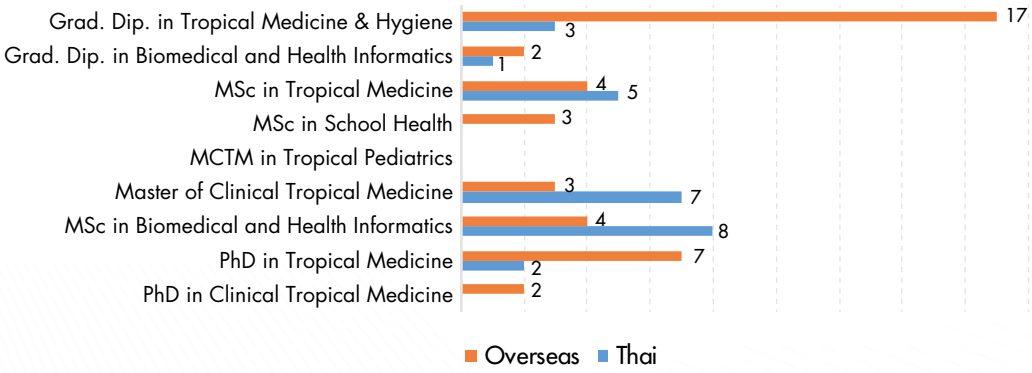
The Bangkok School of Tropical Medicine (BSTM) offers 9 international programs and 3 national programs. Educators at BSTM are established tropical-medicine researchers with extensive experience in basic and applied research, ranging from diagnostics, therapeutics, vaccine development and drug discovery. BSTM graduates are expected to conduct high-quality research into tropical diseases and health science, with career opportunities as lecturers or researchers in government, public, or private institutions, among others.

FACTS AND FIGURES 2023

International Programs

- Doctor of Philosophy in Clinical Tropical Medicine (PhD CTM)
- Doctor of Philosophy in Tropical Medicine (PhD TropMed)
- Master of Science in Biomedical and Health Informatics (MSc BHI)
- Master of Clinical Tropical Medicine (MCTM)
- Master of Tropical Medicine in Tropical Pediatrics (MCTP)
- Master of Science in School Health (MSc SH)
- Master of Science in Tropical Medicine (MSc TM)
- Graduate Diploma in Biomedical and Health Informatics (DBHI)
- Diploma in Tropical Medicine and Hygiene (DTM&H)

Number of students per international program



National Programs

1. Residency Training in Preventive Medicine (Travel Medicine)
2. Practical Nursing School
3. Pre-clinical part of Doctor of Medicine (Collaborative Project to Increase Production of Rural Doctor; CPIRD)

HIGHLIGHTS

Renovated classrooms and facilities

To embrace modernization and provide world-class and a future-proof learning environment, the School has renovated its classrooms and set up new facilities. They renovated 5 classrooms for group teaching that can accommodate 10 persons per room and 1 auditorium with 70-seat capacity, equipped with audiovisual system. Moreover, the School reconstructed a Biosafety level 1 laboratory and set up new facilities, such as a studio AV recording room, co-working space for students, a prayer room, and digital slide scanner.

Lecture room (Artemisia auditorium)

Microscope laboratory room

Recording studio

Student common room and prayer room

STUDENT AWARDS

Chamlong–Tranakchit Harinasuta Awards

BSTM presented the Chamlong-Tranakchit Harinasuta Awards to students in different programs to celebrate their academic excellence and achievements.

The recipients of the Chamlong-Tranakchit Harinasuta Award are Ms. Camille Marie Jeanne Grossen for the D.T.M.&H. program, Mr. Htoo Wai Aung for the Ph.D. TropMed program and Ms. Beatriz Aira Cuchapin Jacob for the MSc TropMed program.

STUDENT ACTIVITIES

Cultural Day

Student Affairs organized “Cultural Days” on 16 August and 13 September 2023 in the Lecture Room, 4th Floor, Chamlong Building. The events aim to promote camaraderie and embrace diversity among students and lecturers via cultural exchange. Activities include cooking, dancing, and introducing their respective countries through presentations.

Field trip studies in the countryside

Field trip studies were organized for DTM&H students at Sunpasitthiprasong Hospital, Ubon Ratchathani, 10-12 October 2023 and Kanchanaburi, 16-20 October 2023. The activities included hospital ward rounds, community health surveys, and insect and animal vector surveys on malaria, intestinal helminths, and protozoa. These activities are required for DTM&H students, to provide them with clinical and research experience in endemic settings for tropical diseases.

DTM&H students during a field trip in Kanchanaburi

Academic forum

The Academic Forum was held at the Faculty of Tropical Medicine on 29 August 2023. It gave students from all programs an opportunity to present and discuss their own thesis project and proposal. Over 85 students and academic staff from all programs joined the event and enjoyed exchanging ideas and opinions, helping students shape their research in the process.

A student presents her research at the Academic Forum

TOWARDS THE FUTURE

The Bangkok School of Tropical Medicine is looking forward to further improving the quality of BSTM programs by passing the AUN-QA Accreditation for MSc (TM) program and reaccreditation for the MCTM program. The School is also planning to develop new mobile applications to improve lectures and related activities for students.

HOSPITAL FOR TROPICAL DISEASES

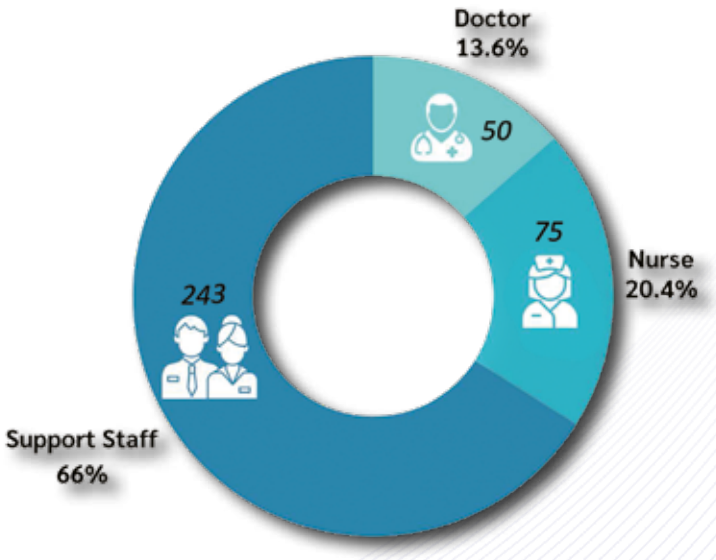
Assoc. Prof.
Watcharapong Piyaphanee
Director

The Hospital for Tropical Diseases is a specialized hospital under the Faculty of Tropical Medicine, Mahidol University. Since 1961, the Hospital has provided comprehensive care in many fields, especially in the diagnosis, laboratory testing, and treatment of tropical diseases. The Hospital also offers world-class care and health services in Travel Medicine.

In 2023, the Health Care Accreditation Institute of Thailand awarded the Hospital a third reaccreditation, which will last for 3 years. In addition, the Health Department of Bangkok Metropolitan Authorities granted the Hospital the Bangkok Clean and Green Award and the Best Innovation Award.

FACTS AND FIGURES 2023

124,739	2,290	10,486	352
Outpatients	Inpatients	Travel Clinic Visits/year	TeleMedicine March 2023- present



HIGHLIGHTS

Smart Hospital

After the COVID-19 pandemic, the Hospital for Tropical Diseases developed new and current services into online platforms such as an appointment system, telemedicine and teleconsultation, access to medical records, and payment system, to name a few. The Hospital launched “HTD Connect”, a mobile application to access and use the hospital’s online services seamlessly. HTD Connect gained 815 registrations in its first year. The Hospital also recorded 9,498 online appointments and 34,685 QR payments. The digital platforms provide efficient services and seamless transactions for both the Hospital staff and patients.

In addition, various IoT (Internet of Things) devices are being utilized to monitor temperature, PM2.5 levels, humidity, and water leaks within various units of the Hospital.

The Hospital plans to further digitalize its Hospital Information Systems (HIS) and develop remote monitoring. The Hospital also aims to provide free Wi-Fi to its visitors and patients.

HTD CONNECT

APPOINTMENT SYSTEM

SERVICES & ACTIVITIES

YMID inpatient 15 Cases through YMID Resource sharing

Innovation for OKRs 24 VDO

RESEARCH AT THE HOSPITAL

In 2023, researchers of the Hospital for Tropical Diseases conducted 24 on-going research projects focusing on malaria, dengue, COVID-19, travel medicine, liver disease, and other tropical diseases.

CENTRAL EQUIPMENT UNIT

The Central Equipment Unit (CEU) provides the students, researchers, and staff of the Faculty of Tropical Medicine with laboratory equipment and purified water for academic and research purposes. The Unit also offers training in instrument use and technical seminars.

A researcher using the GC-MS with ECD

With 48 different types of research equipment located in three areas, the laboratory facilities have been used over 3,000 times. In addition, over 2,300 liters of Type III laboratory purified water, 1,785 liters of Type II, and 3,674 liters of Type I have been provided.

In 2023, 6 equipment training and workshop sessions on using the equipment safely and effectively were organized for students and staff. The training sessions provided knowledge on new scientific technologies and techniques that can inspire a wider range of methodologies in advanced tropical-disease research.

The Unit acquired a new multi-mode microplate reader, which can detect absorbance, luminescence and fluorescence. It will particularly assist research into emerging and re-emerging tropical diseases. The system is being used over 50 times per month.

The Unit introduced online equipment bookings, so that researchers can reserve the necessary equipment in advance, guaranteeing that the equipment will be available when needed.

Some of the equipment available at the Central Equipment Unit

LABORATORY ANIMAL SCIENCE UNIT

FTM-LAU staff and Faculty researchers working in the Procedure Room

The Laboratory Animal Science Unit (FTM-LAU) provides animal facilities and services for the research, testing, and teaching activities of the Faculty of Tropical Medicine. The Unit extends their services to other institutions that require its services.

FTM-LAU ensures animal well-being, the quality of animal research, and the safety of personnel according to ethical and scientific standards of the Faculty of Tropical Medicine Institutional Animal Care and Use Committee (FTM-IACUC) as well as the Ethical Principles and Guidelines for the Use of Animals for Scientific Purposes (National Research Council of Thailand), and Mahidol University policies.

A researcher and veterinarian perform surgery on a rat.

HIGHLIGHTS

In 2023, the Unit served a total of 19 research projects from 8 departments/units in the Faculty, including projects from the Faculty of Dentistry and Chulalongkorn University. More than 700 laboratory animals used in research projects, including 3 different species (mice, rats, and guinea pigs).

The animal research conducted at FTM-LAU includes immunodiagnostics, parasitic infections and life cycles, acute and chronic toxicity, neuroscience, antibody production and vaccine development. The Unit supports technical services by trained veterinary technicians in 7 research projects such as gavage (feeding via tube), injection, perfusion, blood and organ collection, euthanasia and necropsy.

FTM-LAU staff welcomed 6 international interns from National Chiayi University, Taiwan to visit and learn about laboratory animals and selected parasitological research involving animal models

FTM-LAU is committed to improving the quality of animal facilities and services, and developing standard operating procedures to ensure the welfare of laboratory animals and support the research of our Faculty.

TROPICAL MEDICINE DIAGNOSTIC REFERENCE LABORATORY

Staff of TMDR

The Tropical Medicine Diagnostic Reference Laboratory (TMDR) is a unit of the Faculty of Tropical Medicine, Mahidol University. TMDR has been assessed for reassessed with an extended scope as an accredited laboratory in accordance with ISO 15189: 2012 and ISO 15190: 2020 by the Bureau of Laboratory Quality Standards (BLQS), Department of Medical Sciences (DMSc), Ministry of Public Health of Thailand (MOPH). The laboratory is managed by a proficient team of professionals who consistently assess and enhance test methodologies. They diligently maintain laboratory equipment to align with state-of-the-art instrumentation, ensuring efficient test procedures with faster turnaround times.

The following tests have been accredited in accord with ISO 15189 and ISO 15190

- Detection of dengue virus serotype 1, 2, 3 and 4 by RT-PCR
- Detection of dengue virus IgG antibodies by ELISA
- Detection of dengue virus IgM antibodies by ELISA
- Detection of Zika virus by RT-PCR
- Detection of chikungunya virus by RT-PCR
- Parasitology examination

The following tests have been certified as network laboratories by the DMSc, MOPH.

- Detection of SARS-CoV-2 by RT-PCR
- Detection of Monkeypox virus by RT-PCR

TMDR services extend beyond samples from the Faculty's Hospital for Tropical Diseases, including other hospital, public and private laboratories.

Bureau of Laboratory Quality Standards
Ministry of Public Health

This is to certify that

The laboratory of

Tropical Medicine Diagnostic Reference Laboratory,
Faculty of Tropical Medicine, Mahidol University
420/6 Ratchawithi Road, Thung Phaya Thai,
Ratchathewi, Bangkok 10400, Thailand

has been accepted as an
accredited laboratory complying with the ISO 15190 : 2020
and the requirements of the Bureau of Laboratory Quality Standards
within the field of

Medical Laboratory Safety

(Dr. Patravee Soisangwan)
Director of Bureau of Laboratory Quality Standards
Date of Accreditation : 27 January 2023
Valid Until : 3 November 2025
Accreditation Number 4150/60

ACCREDITATIONS

In 2023, BLQS awarded TMDR the 'ISO 15189: 2012/ISO 15190: 2020' accreditation for the following services.

- Detection of Zika virus chikungunya virus and dengue virus by multiplex RT-PCR
- Detection of malaria infection by slide method (thick film and thin film)
- Detection of blood in stool by immunochromatographic method
- Detection of pinworm by Scotch-tape technique

This accreditation proves that TMDR services meet national quality standards and medical laboratory safety practices.

TMDR looks forward to applying for ISO 15189 version 2022 accreditation. They also plan to participate in an internal audit assessment according to ISO 15189 version 2022 and ISO 15190 version 2020 standards.

SPECIAL FOCUS: BIOSAFETY LEVEL 3 LABORATORY

Staff working in the BSL3 Laboratory

The Faculty of Tropical Medicine, Mahidol University aims to excel globally in research, education, and health services in the field of tropical medicine. In pursuit of this mission, a Biosafety Level 3 (BSL-3) laboratory has been constructed on the 9th floor of the Ratchanakarin Building. This facility aims to enhance our capabilities in biosecurity and biosafety, allowing for the handling of highly hazardous pathogens. The BSL-3 was named "Galyani Vadhana Waranusorn Laboratory", in honor of Her Royal Highness Princess Galyani Vadhana.

The construction of the BSL-3 Lab commenced in 2016 and officially began operation in 2023. It is specifically designed for BSL-3 operations, facilitating research and experiments related to pathogenic microorganisms and genetically modified organisms of type 3.

The laboratory incorporates a negative pressure ventilation system equipped with High-Efficiency Particulate Air Filters (HEPA Filter H14 Class). This system is capable of reducing the escape of hazardous microorganisms into the environment by up to 99.995%. The facility includes a stringent access control system to regulate personnel entry and exit, ensuring the highest standards of safety and biosecurity.

In 2024, the team at BSL-3 plans to increase its services, improve and maintain its facilities, and provide relevant workshops and training for the students and staff of the Faculty.

Some of the equipment available at BSL3

Opening Ceremony

On 21 November 2023, the Faculty organized a press conference for the Opening Ceremony of the Kalyani Vadhana Waranusorn Laboratory. The event was presided over by Assoc. Prof. Weerapong Phumratanaprapin, Dean of the Faculty of Tropical Medicine, who provided a report and introduction for the BSL-3.

Prof. Banchong Mahaisavariya, President of Mahidol University, conveyed congratulations on this significant achievement. Prof. Piyasakol Sakolsatayadorn, President of Mahidol University Council, also expressed his congratulations and served as the guest speaker for the opening ceremony.

Executives of the Faculty of Tropical Medicine and Mahidol University during the Opening Ceremony for the BSL-3

Following these speeches, Research Prof. Jetsumon Prachumsri, Deputy Dean for Research, summarized the research projects that will be conducted in the BSL-3 laboratory. Additionally, Associate Professor Dr. Pornsawan Leaungwutiwong, Deputy Dean for Research Compliance, provided a lab tour and an overview of BSL-3's operations.

JOINT INTERNATIONAL TROPICAL MEDICINE MEETING (JITMM) 2023

878	61	289	10	12
Attendees	Sessions	Presentations	Young Investigator Awards	Travel Awards

The Faculty of Tropical Medicine, Mahidol University organized the Joint International Tropical Medicine Meeting (JITMM) 2023 on 13-15 December 2023 at Eastin Grand Hotel Phyathai, in Bangkok, Thailand. For the second time, the Meeting was held via a hybrid platform to allow online participation, providing an inclusive platform for those unable to travel abroad.

JITMM 2023 brought together almost 900 participants from 34 countries, of whom the majority attended on-site. This was the largest attendance since the inception of JITMM.

With the theme "Achieving the SDGs: Human and AI-driven Solutions for Tropical Medicine in a Changing World", JITMM 2023 highlighted the role and impact of innovative technologies on advances in tropical medicine and sustainable development amidst critical global challenges.

A pre-meeting workshop, entitled "Global diagnostic tools development for tropical diseases", was organized on 12 December 2023 at the Meeting venue. It aimed to connect diagnostic experts from around the world with researchers and companies. The workshop offered consultation sessions and potential collaborations among the participants. It was attended by over 70 participants.

National and international luminaries in tropical medicine and public health participated at JITMM 2023. Prof. Kiat Ruxrungtham, a celebrated vaccine expert in Thailand, served as the Opening Keynote Speaker and presented "mRNA Vaccines: Pandemic Preparedness and Beyond".

Prof. Kiat Ruxrungtham (left) and Dr. Carlos J. Cuellar (right)

In the Closing Ceremony, Dr. Carlos J. Cuellar, Executive Vice-President of University Research Co., LLC (URC), delivered his Keynote Speech "Applying System Thinking to Bring Innovation to Tropical Diseases Control and Elimination".

JITMM 2023 was co-organized by Mahidol University, the Thai Department of Disease Control, Ministry of Public Health (MOPH), Mahidol University's Faculty of Medicine Siriraj Hospital, Chulalongkorn University's Faculty of Medicine, Mahidol Oxford Tropical Medicine Research Unit (MORU), and SEAMEO TropMed Network.

AWARDS

RECIPIENT	Honor or Award	Awarding Institution
Prof. Emer. Punnee Pitisuttithum	Mahidol University's Top 1% Researchers	Mahidol University
Prof. Polrat Wilairatana		
Prof. Kesinee Chotivanich		
Prof. Mallika Imwong		
Research Prof. Jetsumon Prachumsri		
Prof. Direk Limmathurotsakul		
Prof. Emer. Punnee Pitisuttithum	World's Top 2% Scientists	Stanford University
Prof. Polrat Wilairatana		
Prof. Mallika Imwong		
Prof. Emer. Punnee Pitisuttithum	Researcher of the Year, Lifetime Achievement	Mahidol University
Prof. Emer. Punnee Pitisuttithum	Research Award	Royal College of Physicians of Thailand
Prof. Emer. Punnee Pitisuttithum	TRF Senior Research Scholar Award	National Research Council of Thailand
Prof. Kesinee Chotivanich	Role Model Lecturer	Lecturer Council Faculty of Tropical Medicine, Mahidol University

RECIPIENT	Honor or Award	Awarding Institution
Prof. Mallika Imwong	National Outstanding Researcher Award in the field Medical Science	Mahidol University
Prof. Narisara Chantratita	Appointed President of Mahidol University Faculty Senate	Mahidol University
Prof. Passanesh Sukphopetch	Rangsit Alumni Award 2023	Rangsit University
Assoc Prof. Jiraporn Ruangsittichai	Model Teacher of the Year	Tropical Medicine Faculty Council, Mahidol University
Assoc. Prof. Aongart Mahittikorn	Outstanding Alumni Award	Faculty of Public Health, Mahidol University
Assoc. Prof. Jittima Dhitavat	The United Kingdom Professional Standards Framework (UKPSF) Level Senior Fellow (SFHEA)	Advance HE
Assoc. Prof. Kriengsak Limkittikul	Exemplary Teacher on Health Sciences	Mahidol University Faculty Senate
Assoc. Prof. Onrapak Reamtong	The Exemplary Lecturer on Technological Sciences Award	Mahidol University
Assoc. Prof. Onrapak Reamtong	the Outstanding University Employees who have worked for 10 years (but not over 20 years)	Mahidol University
Assoc. Prof. Pongrama Ramasoota	Euglena Award	Tech Planter Asia Final 2023
Assoc. Prof. Pongrama Ramasoota	Leave a Nest Award	Tech Planter Asia Final 2023
Assoc. Prof. Pannamthip Pitaksajjakul		
Dr. Rochanawan Sootichote		
Ms. Namfon Ekkason	TropMed Plastic Waste Battle 2023 Award	Faculty of Tropical Medicine, Mahidol University
Ms. Preeyanate Datong	Best Paper Award	7th TICC International Conference 2023: Towards Sustainable Development Goals: Digital transformation and beyond
Ms. Wilanee Dechkhajorn	National Research Award: Invention Award, Consolation Prize	National Research Council of Thailand

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