Advancing Cosmetosciences through Bilateral Collaborations

11 May 2022

VIRTUAL MEETING

1st Franco-Thai Seminar on Phytocosmeceutical Research and Applications

CONVENORS

Dr Duangjai Tungmunnithum Mahidol University of Bangkok - TH

Dr Arnaud Lanoue - University of Tours - FR

Dr Aekkhaluck Intharuksa - Chiang Mai University - TH

Prof. Leslie Boudesocque-Delaye University of Tours - FR

Dr Ruhainee Tohkayomatee - Princess of Naradhiwas University - TH

Prof. Emilie Destandau - University of Orléans - FR

Dr Varin Titapiwatanakun - Chula-longkorn University of Bangkok - TH

Dr Veerawat Teeranachaideekul - Mahidol University of Bangkok - TH

Dr Christophe Hano - University of Orléans - FR

Prof. Yohei Sasaki - Kanazawa University - JP

LE STUDIUM Loire Valley Institute for Advanced Studies

FRANCO-THAÏ

SEMINAR

VIRTUAL | 11 MAY 2022

ABSTRACTS

1st Franco -Thai Seminar on Phytocosmeceutical Research and Applications

CONVENORS

Dr Duangjai Tungmunnithum
LE STUDIUM RESEARCH FELLOW
FROM: Department of Pharmaceutical Botany, Mahidol University - TH
IN RESIDENCE AT: Laboratory of Woody Plants and Crops Biology (LBLGC) / INRAe, University of Orléans - FR

Dr Arnaud Lanoue
University of Tours - FR

Dr Aekkhaluck Intharuksa
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University of Tours - FR

Dr Ruhainee Tohkayomatee
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Dr Veerawat Teeranachaideekul
Mahidol University of Bangkok - TH

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Prof. Yohei Sasaki
Kanazawa University - JP

ORGANISERS

Cosmetosciences ARD CVL Programme

French Embassy in Thaïland - Campus France Programme

INTRODUCTION

The 1st Franco-Thai Seminar on Phytocosmeceutical Research and Applications brings together French and Thai researchers with common interests in natural botanical sourcing, phytochemistry, including green extraction and analytical methodologies, evaluation of biological activity and formulation, and interface disciplines applied to phytocosmeceutical research and applications. This is a unique opportunity to present, share, and discuss scientific results and scientific skills, while also stimulating cooperation between laboratories in both countries through the Le Studium actions (fellowship, experts' visits, Consortium networking meeting), the CosmetoSciences and Campus France Franco-Thai mobility programmes.

The meeting will be held online and will comprise nine plenary talks delivered by invited scientists from both countries, as well as a guest invited lecture from Japan.

PROGRAMME

WEDNESDAY, MAY 11TH 2022 (08:40-13:50 PM ; GMT+2:00 - PARIS)

OPENING CEREMONY

8.40 French Embassy and Campus France in Thailand

8.55 CosmetoSciences, Cosmetic Valley

9.10 Mahidol University

9.20 Dr Bhanubong Bongcheewin - The Mint family (Lamiaceae) in Thailand- A potential material source for phytocosmeceutical application.

SESSION 1: NATURAL SOURCING

9.30 Dr Duangjai Tungmunnithum - Natural Plant Diversity: A Potential Source of Raw Materials for Phytocosmeceutical Research and Applications

9.50 Dr Arnaud Lanoue - Agricultural by-products valorization

10.10 Dr Aekkhaluck Intharuksa - Phytochemical Analysis and Antioxidant, Antimicrobial, and Antiaging Activities of Ethanolic Seed Extracts of Four Mucuna Species

SESSION 2: GREEN EXTRACTION & ANALYTICAL METHODS

10.30 Prof. Leslie Boudesocque-Delaye - Natural Deep Eutectic Solvents: fad or real opportunity?

10.50 Dr Ruhainee Tohkayomatee - Green extraction of Thai medicinal plants

11.10 Prof. Emilie Destandau - Molecular network

SESSION 3: FORMULATION & BIOLOGICAL ACTIVITIES

11.30 Dr Varin Titapiwatanakun - Cocrystal engineering of oxyresveratrol

11.50 Dr Veerawat Teeranachaideekul - Green extraction of Thai medicinal plants

12.10 Dr Christophe Hano - New in vitro and cellular models for cosmetic applications

PLENARY LECTURE:

12.30 Prof. Yohei Sasaki - Quality Evaluation of Rehmannia glutinosa by Morphological, Genetic and Chemical Study

GENERAL DISCUSSION & FUTURE PLANS

Presentations of the Franco-Thai Mobility Programme & LE STUDIUM

13:50 End

ARD CVL
COSMETOSCIENCES PROGRAMME

In an international framework characterised by changing regulatory regimes and increasingly harsh competition, research and innovation are key factors to ensure smart specialisation and sustainable economic development of territories and stakeholders. In the very well-established perfume and cosmetic industry of the Centre-Val de Loire region, the COSMETOSCIENCES programme aims at giving a significant impetus to research projects with a strong character of innovation to unlock industrial development blockages by opening the door to new concepts and enabling the creation of new startups. It fosters French leadership in the sector and the leadership of the Centre-Val de Loire region, particularly with regard to sustainable cosmetics.

Rooted in the Centre-Val de Loire region, the Cosmetosciences programme revolves around the structuring of research at the national level on this cosmetic theme. It brings twelve laboratories together and is driven by the University of Orléans, together with the University of Tours and the CNRS. It strives to increase the visibility of cosmetic research and funding with the recruitment of PhD students and postdoctoral fellows for collaborative projects between academia and the cosmetic industry. The programme covers the whole value chain of cosmetic products.

COSMETOSCIENCES led to the creation of We Lab Cosmetic in the first part of the programme, which offers access to standard equipment in three laboratories (plant chemistry, biology and formulation), technical support and a strong link with the regional ecosystem for innovation, accompanying students and/or independant actors in the success of their entrepreneurial project.

The scientific scope of the programme has been defined to specifically respond to the scientific challenges of the cosmetic fields according to three development axes:

1. Naturalness and ecofriendly processes
2. Characterisation of biological activity and product safety
3. Formulation & sensoriality

Cosmeto sciences

Recherche & Industrie, innovons ensemble

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SPEAKERS

SPEAKERS

Dr Bhanubong Bongcheewin

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My principle work is to lecture for pharmacy students mainly in Pharmaceutical Botany and do research on plant taxonomy and systematics of the family Lamiaceae and botanical crude drug authentication.
My current research includes:

- A revision of Hymenopyramis (Lamiaceae) in Thailand.
- A revision of Glossocarya (Lamiaceae) in Thailand.
- A revision of Pogostemon (Lamiaceae) in Thailand.
- An authentication of crude drugs used in Thai traditional medicine..

The Mint family (Lamiaceae) in Thailand- A potential material source for phyto-cosmeceutical application

Lamiaceae is the large family, consisting of more than 7,000 species worldwide. In Thailand, there are 52 genera, ca. 285 species enumerated for the Flora of Thailand account. The family is the important source for phytochemical compounds, such as essential oils, flavonoids, terpenoids. Some species with potential uses for cosmetics are reviewed.

Prof. Leslie Boudesocque-Delaye

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Pr L Boudesocque Delaye is a graduate of the Faculty of Pharmacy of Reims Champagne Ardenne, where she validated her PharmD in 2008. She carried out her PhD on purification processes using Centrifugal Partition Chromatography for natural peptides under the direction of Pr JH Renault, which she obtained in 2010. After a post-doctorate in 2011 within the company Lonza (Visp, Switzerland), she joined the University of Tours as a lecturer in September 2011. She was promoted to full professor in 2020. Her research themes revolve around the development of innovative and eco-designed processes to facilitate access to metabolites of biological interest, within plant or microalgal biomass. In particular, it has recognized know-how in the design of apolar natural eutectic solvents.

Natural Deep Eutectic Solvents: fad or real opportunity?

NaDES appeared at the end of the 2010s following the work of Dai et al. Since then, the enthusiasm for these new green solvents linked to ionic liquids has continued to grow. Indeed, the unique properties of these solvents (solubilization capacity, biocompatibility, selectivity, stabilization) make them alternatives to classical solvents. While academic research is intense, few industrial applications have emerged, due to several technological obstacles: tedious preparation, extractive processes not well suited to the industrial scale, and limited options in terms of composition, in particular for non-polar system. At the SIMBA laboratory, we are specialized in the design of NaDES dedicated to the cosmetics field. Several applications have been developed for the recovery of microalgal or plant biomass. Spirulina (Arthrospira platensis) has been particularly studied within our group. At the same time, our laboratory has recognized know-how in the development of eco-designed extractive processes, which has enabled us to design innovative processes that simplify the use of NaDES while improving extractive performances.

Finally, in collaboration with the NMNS team (Pr E Munnier, Dr F Bonnier), we investigate formulability of these NaDES as well as the development of routine analytical approaches for the characterization of the extracts, in order to validate the compatibility of NaDES with industrial applications, in particular in the cosmetics field.

Prof. Emilie Destandau

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Emilie Destandau works on natural compound analysis at the Institute of Organic and Analytical Chemistry (ICOA UMR 7311). She develops eco-responsible extraction methods using microwave assisted or pressurized liquid extraction and chromatographic analyses mainly with thin layer chromatography and liquid chromatography hyphenated to mass spectrometry to separate and identify the bioactive molecules. To help compound identification and extract comparison mass spectrometry data were processed with bio-informatic or chemometric tools to generate more useful cartographies that facilitate data interpretation. These metabolomics approaches are applied to the production of active ingredients for cosmetics as well as to the study of changes in metabolic expression of plants subjected to different types of conditions.

Molecular Network

Specialised metabolites constitute a high valuable resource of bio-active compounds that are highly sought after for pharmaceutic and cosmetic applications. However, plant extracts are very complex and the characterisation of their molecular composition or the targeting of molecules responsible for the extract biological activity is really challenging. To perform compound identification Ultra High Performance Liquid Chromatography hyphenated to High-Resolution Mass Spectrometry (UHPLC-HRMS) is one of the most used techniques. Indeed, it allows to separate the different compounds according to their polarity and to obtain their exact mass that could be associated to their molecular formula. As the UHPLC-HRMS is a powerful technique numerous mass spectra containing each of them several characteristic ions (molecular and fragment ions) are recorded, the data interpretation for a complex extract remains long and fastidious. Thus, different chemometric and bio-informatic tools can be used to help compound identification. Among them Molecular Network permits to associate compounds with similar mass spectrum into a same cluster, while compounds with different mass spectrum are distinguished in another cluster or placed as single nod. A cartography of the extract is obtained with a classification of compounds according to their mass spectrum that is related to their molecular structure. Moreover, this map facilitates the comparison of extracts and the identification of bioactive compounds in the complex extract.

Dr Duangjai Tungmunnithum

Le Studium Research Fellow

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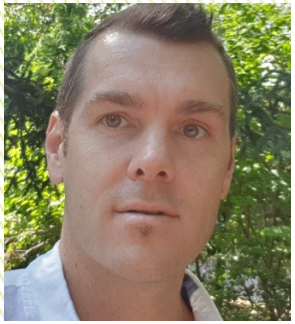
Assistant Professor Dr. Duangjai Tungmunnithum completed her Ph.D. from Chulalongkorn University in 2016, and won the DPST Postdoctoral Fellowship to conduct her Postdoctoral research in Japan at the National Museum of Nature and Science collaborate with the University of Tokyo focusing on medicinal plant and phytochemistry in the same year. After completing her research in Japan, she was soon getting a permanent lecturer position at the Faculty of Pharmacy, Mahidol University, Thailand. She experts in Pharmaceutical Botany, biochemistry, innovative green extraction methods, biological activity both antioxidant and anti-aging from plant extracts and pure phytochemical compounds for cosmetic and pharmaceutical applications both in vitro, in vivo and in cellulo models. According to her research profiles, she has awarded by many outstanding research grants from both national and international funding sources e.g. the Junior Research Fellowship from French Embassy and Campus France, Sakura Science Program from Japanese Government, Franco-Thai Mobility Programme 2020-2021 funding by French and Thai Governments, LE STUDIUM Research Fellowship, and so forth.

Natural Plant Diversity: A Potential Source of Raw Materials for Phytocosmeceutical Research and Applications

Nowadays, there is no denying that natural plant extracts as well as the isolated phytochemicals has been increasingly interested by both pharmaceutical industries and customers. The potential starting material from various parts of plants have been continuously researched on their phytochemical profiles and biological activities e.g. antioxidant and anti-aging potentials. Natural plant diversity becomes a potential source of raw materials for phytocosmeceutical research and applications. Here in our research team and collaborative projects dealing with a large number of plant species, we investigate their phytochemical profiles, characterized biological activities starting from in vitro tests by validating various antioxidant assays which are approved by FDA, as well as to determine the antioxidant mechanisms via hydrogen atom transfer (HAT) or electron transfer (ET). Then, the effective in vitro anti-aging assays were employed using both the classic approaches (collagens, tyrosinase, elastase and hyaluronidase inhibitory tests) and the emerging approaches such as SiRT1 and advanced glycation end products (AGEs) tests. The innovative *in cellulo* assay using yeast as the novel potent model was employed in our research team to investigate antioxidant and anti-aging actions of the extracts and phytochemicals at the cellular level. The potential plants extracts from various plant families both gymnosperm and angiosperm such as Ginkgoacea, Fabaceae, Linaceae, Lamiaceae Nelumbonaceae, Nymphaeaceae, Pontederiaceae and so forth have been employed in different collaborative projects. These plant materials were performed and extracted using green extraction technology couple with experimental designs for screening strategy and correlation analysis, so as to identify the potent and precious phytochemical compounds for phytocosmeceutical and cosmetic applications.



Dr Christophe Hano

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Christophe Hano, completed his Ph.D. in 2005 in Plant Biochemistry and Molecular Biology, is currently Assistant Professor at the University of Orleans. His research focuses on applied plant metabolism and biotechnology. He has written more than 200 scientific peer-review papers, reviews, and book chapters in internationally renowned journals, and he edited a variety of journal topical issues on plant secondary metabolism, including polyphenols as well as books on the anti-aging action of polyphenols. He is Academic Editor and Editorial Board Member of several renowned Q1 Journals in Biochemistry and Biotechnology. He is working on research projects targeted at analyzing plant secondary metabolites in order to produce natural extracts with cosmetic applications.

New in vitro and cellular models for cosmetic applications

Aging is a dynamic and complex biological process involving multiple actors and subject to a number of genetic and/or environmental influences. A variety of theories were suggested to explain the aging process, including the free radical theory of aging proposed by Prof. Harman in 1956. Undoubtedly, this theory was the most widely studied and continues to be revised, and so far, it remains a sound theory. The theory explains that aging can be caused by excessive oxidative stress.

Evidence that polyphenols have prolonged the lifespan of different species, operating through a well-conserved mechanism, was first described in yeast and then confirmed in many other model species such as Caenorhabditis elegans, Drosophila melanogaster and mice. Yeast cells prove an excellent model for evaluating the in vivo antioxidant capacity of polyphenol in the context of cellular oxidative stress. The mechanisms of defense and adaptation to oxidative stress are well established and can be extrapolated to human cells.

Among the appealing targets are sirtuins (SIRT), a conserved family of protein deacetylases with some solid evidence linking its function to ROS and aging. In yeast, SIRT activation by polyphenols has been proposed both gene expression level and enzyme activation. Such studies may provide important information for the use and development of anti-aging plant sources and derived compounds.

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I am an Assistant Professor at the Faculty of Pharmacy, Chiang Mai University, Chiang Mai, Thailand, and a Collaborative Professor at Kanazawa University, Ishikawa, Japan. In 2016, I graduated Doctor of Philosophy in Medical Sciences (Pharmaceutical Sciences) from Kanazawa University, Ishikawa, Japan. The current research interests are (1) Quality controls of crude drugs, traditional medicines, and herbal products, (2) Identification and authentication of medicinal plants using molecular and chemical analyses, and (3) Ethnopharmacology of medicinal plants such as Mucuna spp. (Fabaceae), Mitragyna spp. (Rutaceae), Pueraria candollei (Fabaceae), and Myristica fragran (Myristicaceae).

Phytochemical Analysis and Antioxidant, Antimicrobial, and Antiaging Activities of Ethanolic Seed Extracts of Four Mucuna Species

The investigation into promising botanical materials for natural cosmetics is expanding due to environmental and health awareness. Here, we aimed to evaluate the phytochemical substances and the potential skin-related pharmacological activities of four *Mucuna* seeds, namely M. *gigantea* (Willd.) DC. (MGG), M. *interrupta Gagnep.* (MIT), M. *monosperma* Wight (MMM), and M. *pruriens* (L.) DC. (MPR), belonging to the Fabaceae family. In methodology, the Mucuna seeds were authenticated using morphological and molecular approaches. L-DOPA, phenolics, and flavonoid content, incorporated with HPLC and GC–MS fingerprinting analyses, were determined. Then, skin-related antimicrobial, antioxidant, and antiaging activities were determined. The results revealed that MPR showed the highest L-DOPA content (75.94 mg/100 mg extract), whereas MGG exhibited the highest phenolic and flavonoid content (56.73 ± 0.62 mg gallic/g extract and 1030.11 ± 3.97 mg quercetin/g extract, respectively). Only MMM and MPR could inhibit all of *S. aureus*, *S. epidermidis*, and *C. albicans*, but no sample could inhibit C. acnes. Furthermore, all samples demonstrated antioxidant activity. Interestingly, all *Mucuna* samples exhibited strong collagenase, elastase, and hyaluronidase inhibitory activities. We conclude that the ethanolic extracts of four *Mucuna* seeds are probably advantageous in the development of skincare cosmeceutical products.

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Dr Arnaud Lanoue is a phytochemical analyst at University of Tours (France). He obtained a joint Ph.D. at the universities of Amiens (France) and Geneva (Switzerland) in 2002, where he studied the bioproduction of alkaloids in transgenic roots grown in bioreactors. He conducted postdoctoral research at the Juelich Research Center (Germany) on plant natural products as signaling molecules within Marie Curie Research Training Network. He is currently Associate Professor in the Department of Pharmaceutical Sciences at the University of Tours. Since 2007, he is involved in research projects on plant bioactive molecules including polyphenols, alkaloids and triterpenoids. He has co-authored 70 peer-reviewed papers (h-index 25) with 2100 citations. He is supervising the analytical platform at Laboratory "Biomolecules and Plant Biotechnologies" where he developed metabolomics tools coupled to multivariate statistics to screen metabotypes of plant biomass issued from natural resources or biotechnological processes for applications in agroecology, human health and cosmetic purposes..

Embrassing the molecular diversity of grapevines to produce natural cosmetic ingredients

Winemaking generates different biomolecule-rich byproducts, including pomaces (skin and seeds), lees, as well as other solid wastes like grape canes. Among them, grape wood biomass, which are discarded after winter pruning, represent great potential for the development of new natural cosmetic ingredients due to a large abundance and the presence of polyphenols including stilbenoids. It is assumed that the polyphenol content in grapevines might change according to genotypes and environmental parameters. Considerable advances have been made in the chemical characterization of wines, particularly volatiles and polyphenolic compounds using advanced metabolomics tools. However, the metabotyping of grapevine organs, i.e. the characterization of metabolic phenotypes, is very limited. Analytical methods using Ultra High Performance Liquid Chromatography (UPLC) in tandem with Diode Array Detection (DAD) and Mass Spectrometry (MS) in combination with chemometric analyses have been developed offering rapid and comprehensive metabolomic analyses of grape chemical composition. We explored the metabolic variations of polyphenol metabolism depending on varietal diversity and how these variations influence the cosmetic potential of the resulting natural ingredients.

Prof. Yohei Sasaki

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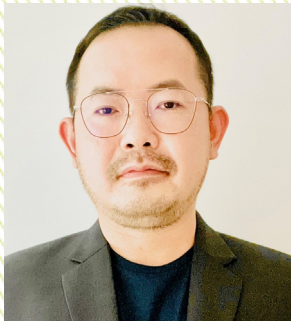
I am a professor in School of Pharmacy, and Director of Medicinal Plant Garden at Kanazawa University. I am studying about cultivation and processing methods to produce Japanese herbal medicines. My goal is to improve the self-sufficiency rate of Japanese herbs that depend on foreign products. My hobby is hiking and travelling.
Education: Institute of Natural Medicine, Toyama Medical and Pharmaceutical University (Ph.D. in Pharmacy, 2000-2003), Graduate School of Natural Science and Technology, Kanazawa University (1998-2000), Faculty of Pharmaceutical Sciences, Kanazawa University (1993-1997).
Membership: The Japanese Society of Pharmacognosy (Editor), Japan Society of Medical and Pharmaceutical Societies for Traditional Medicine (Editor), Japan Association of Botanical Gardens (Director, Chief Editor).

Quality Evaluation of *Rehmannia glutinosa* by Morphological, Genetic and Chemical Study

Previously, the medicinal plant, *Rehmannia glutinosa*, is grouped into two types in Japan. However, previous reports of genetic analysis of *R. glutinosa* in commercial products suggest the existence of varieties other than these two, and therefore, it is inappropriate to simply classify this medicinal plant into these two varieties. In this current study, we clarified the diversity of *R. glutinosa* cultivated in Japan on the basis of morphological observation and genetic analysis. We conducted principal component analysis (PCA) of *R. glutinosa* morphology, including leaf surface color, leaf undersurface anthocyanin coloration, root shape, and the ratio of string root. We also performed (1) sequence-related amplified polymorphism (SRAP) analysis and (2) polymorphism analysis of the TEOSINTE BRANCHED1, CYCLOIDEA, and PCF (TCP) gene region. Our results showed that *R. glutinosa* roots have various weights, diameters, and lengths, and there are differences between individuals and within an individual immediately after harvest. We found that, catalpol content in the roots tended to increase as root diameter increased. Furthermore, it has been reported that catalpol content decreased with drying, and our results also supported this phenomenon. Based on the above results, we proposed that slicing the roots and rapidly removing water by natural drying is best to obtain dry root with little loss of catalpol content. Our present results provided the information necessary for the stable quality of *R. glutinosa* roots which is the important part of this medicinal plant for the uses in traditional medicine preparation and phytocosmeceutical applications.



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Dr. Veerawat Teeranachaideekul graduated in Pharmaceutical Sciences from the Faculty of Pharmacy, Mahidol University, Thailand in 2008. After graduating, he became a researcher at a cosmetic company in Thailand for more than 6 years. Currently, he is an Assistant Professor at the Department of Pharmacy, Faculty of Pharmacy, Mahidol University. In addition, he is a Deputy Director of the MUPY Dermocosmetic Testing Center at the Faculty of Pharmacy, Mahidol University. His major research interests are topical and dermal drug delivery systems.

Transfersomes for topical delivery of herbal extracts

Nowadays, biologically active compounds obtained from plants have been widely used in cosmetics. This is because the consumers believe that plant-based ingredients are more effective and safer compared to synthetic ones. A great number of researchers have studied and reported advantages of plant-based ingredients such as antioxidant, anti-aging, anti-inflammatory, antimicrobial, and skin whitening properties. However, it has been reported that several active compounds from plants are not stable and have low skin absorption. Therefore, the encapsulation technique has been used to enhance chemical stability and also deliver active ingredients into the skin. Transfersomes are one of encapsulation technologies that were introduced in the 1990s. The compositions of transfersomes are similar to liposomes but the vesicle membrane of transfersomes contains an edge activator. The edge active is a membrane-softening agent which helps the ultra-deformable property of the transfersomes, resulting in the enhancement of skin permeation. In addition, it was found that transfersomes can be used as drug carriers for hair follicle targeting and provide sustained or prolonged release behavior.

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Varin Titapiwatanakun received her B.Sc. in Pharmaceutical Sciences from Chulalongkorn University, Thailand and Ph.D. in Pharmaceutics from University College London, The School of Pharmacy, UK. Currently, she worked as a lecturer at the Department of Pharmaceutics and Industrial Pharmacy, Faculty of Pharmaceutical Sciences, Chulalongkorn University. Her research interest covers novel drug delivery system, 3D printing, cocrystallization and particle engineering. In 2018, she received research grants from the Faculty of Pharmaceutical Sciences, Chulalongkorn University and MPU-AACDD. She was a visiting scholar at Molecular Pharmaceutics Laboratory, Meiji Pharmaceutical University (MPU), and has started her research collaboration with Professor Toshiro Fukami. She has served as a referee for journals in pharmaceutical sciences.

Cocrystal engineering of oxyresveratrol

Oxyresveratrol (ORV) is a compound found in the heartwood of *Artocarpus lakoocha* Roxburgh (Moraceae). It has diverse biological and therapeutic activities covering antioxidant, anti-inflammatory, neuroprotective, antimicrobial. However, it has poor water solubility, oral availability and stability which challenge to delivery design and product development. Cocrystal engineering has been reported to be able to modify the physicochemical properties of a chemical compound and produce a superior chemical candidate for formulation design. 77 cocrystal formers with various functional groups were used for cocrystal screening via grinding, liquid-assisted grinding, solvent evaporation and slurry methods. Eight cocrystals (ORV with citric acid, glutaric acid, betaine, L-proline, isonicotinamide, nicotinamide, urea and ethyl maltol) were successfully produced and characteristic crystal properties were confirmed by powder X-ray diffraction, low frequency Raman spectroscopy and thermal analysis. The ORV-citric acid cocrystal showed enhanced solubility and permeability across the human intestinal tract. While the crystal structures of ORV-betaine and ORV-proline cocrystals were identified and solved by single-crystal X-ray diffraction. Therefore, cocrystallization could be applied to design novel parent molecules including drugs, herbal substances and vitamin for innovative delivery systems.

Dr Ruhainee Tohkayomatee

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My name is Ruhainee Tohkayomatee. I was born on February 25, 1988 in Yala province, Thailand. I received Bachelor's Degree in Biology from Faculty of Science, Prince of Songkla University in 2010 followed by received Master's Degree in Pharmacology from Faculty of Science, Prince of Songkla University in 2013. I recently graduated from Faculty of Science, Mahidol University in Doctor of Philosophy Degree in Pharmacology. Currently, I served in position of lecturer of Pharmacology at Faculty of Medicine, Princess of Naradhiwas University. My research interests are in pharmacology of medicinal plants and anticancer drug discovery. I'm currently studying the signalling pathways downstream of the estrogen receptor in breast cancer cell lines.

Green extraction of Thai medicinal plants

Extraction is a major step to separate bioactive compounds from raw material and medicinal plants, which extracted by the pharmaceutical industry, either with conventional methods or modern technologies. The conventional methods such as maceration, reflux and Soxhlet extraction, which usually uses of organic solvents such as methanol, ethyl acetate, dichloromethane and others. Nevertheless, the organic solvents are problematic in the extraction of bioactive compounds from the herbal plant because of their toxicity, volatility and flammability. Moreover, some methods use high energy consumption and the large amount of solvents, and may have lower extraction efficiencies. Thus, the separation of bioactive compounds in industrial scale for pharmaceutical and cosmetic applications, green and efficient extraction process that are free toxic solvents is being emphasized. Nowadays, green extraction methods have been developed for the extraction of bioactive compounds from herbal plants including ultrasound-assisted extraction (UAE), microwave-assisted extraction (MAE), etc. The advantages of both UAE and MAE methods are using shorter extraction time and lower temperature, and decreased the amount of solvent required. Recently, many medicinal plants use green extraction to separate biological active compounds such as extraction of rhinacanthin-C from Rinacanthus nasutus (R. nasutus) with MAE method by comparison with the conventional extraction method including maceration (Shakya K, 2015). The MAE significantly increased rhinacanthin-C content and markedly reduced the extraction time when compared to the maceration method (Shakya K, 2015). The extraction of Thai traditional medicinal extract, U-pa-ri-waat (URW) using MAE and traditional solvent extraction was compared based on the percent yield and determined antioxidant activity (Jaisamut P, 2021). Comparing the two extraction methods, MAE provided an extract yield similar to the water decoction, while MAE method had a tenfold decrease in extraction time when compared to the traditional method. Moreover, both MAE and tradition decoction methods for URW have been shown to have effective antioxidant activity. Other example, Thai herbal formula Kleeb Bua Daeng (KBD) was extracted with UAE and MAE methods. KBD was extracted with MAE method had higher yield, total phenolic content, total flavonoid content, total carotenoid content, and total anthocyanin content than UAE method and MAE appeared to be an efficient extraction method for this Thai herbal formula (Ngamkhae N, 2022). In conclusion, the green extraction methods were fast and reduced the amount of solvent for efficient extraction of total bioactive compounds from medicinal plants. Recent findings of green extraction method could potentially be used to develop herbal formulations with higher content and efficiency of active compounds.

PAST LE STUDIUM CONFERENCES

2022

Dr Franciska Vidáné Erdő, Prof. Emilie Munnier & Dr Franck Bonnier
Skin Models in Cosmetic Science: Bridging Established Methods and Novel Technologies
7-8 April 2022

2021

Dr Robert Courtois
De la séduction à l'agression ? La question du harcèlement
29-30 November 2021

Prof. Adrian Wolstenholme, Prof. Georg von Samson-Himmelstjerna & Dr Cédric Neveu
New approaches to get around roundworms
29 November - 1 December 2021

Dr Valérie Hayaert, Hélène Jagot & Christophe Regnard
Justice en scène(s)
11-12 October 2021

Dr Raphaël Cahen, Prof. Pierre Allorant & Prof. Walter Badier
Law(s) and International relations : actors, institutions and comparative legislations
15-17 September 2021

Prof. Eugeen Schreurs, Prof. Philippe Vendrix & Wendy Wauters
Music and Lived Religion in the Collegiate Church of Our Lady in Antwerp (1370 - 1566). A Multidisciplinary Study in a European context
2-4 September 2021

Dr Cristina Del Rincon Castro & Dr Elisabeth Herniou
2021 International Congress on Invertebrate Pathology and Microbial Control & 53rd Annual Meeting of the Society for Invertebrate Pathology
28 June - 2 July 2021

Dr Edurne Serrano-Larrea, Dr Conchi Ania & Dr Encarnacion Raymundo-Piñero
Challenges and opportunities in materials for green energy production and conversion
15-17 June 2021

Prof. Maxwell Hincke & Dr Sophie Réhault-Godbert
Innate immunity in a biomineralized context: trade-offs or synergies?
23-24 March 2021

Dr Rebecca Tharme & Prof. Karl Matthias Wantzen
Managing riverscapes and flow regimes for biocultural diversity
20-21 January 2021

2020

Dr Magdalena Malinowska & Dr Arnaud Lanoue
Exploring the molecular diversity of grape, a source of natural ingredients
3 December 2020

Dr Jean-François Deluchey & Prof. Nathalie Champroux
What are our lives worth to a neoliberal government?
Capitalism, War and Biopolitics in the Pandemic Era
18 - 19 November 2020

Prof. Pieter Hiemstra & Dr Mustapha Si-Tahar
Novel host- and microbiota-directed strategies for treating respiratory infections
24 - 25 September 2020

Dr Emilio Maria Sanfilippo & Xavier Rodier
FAIR Heritage: Digital Methods, Scholarly Editing and Tools for Cultural and Natural Heritage
17-18 June 2020

Dr Margriet Hoogvliet & Prof. Chiara Lastraioli
Spatial Humanities and Urban Experiences During the Long Fifteenth Century
11 Mai 2020

Dr Thimmalapura Marulappa Vishwanatha & Dr Vincent Aucagne
Challenges and prospects in chemoselectuve ligations: from protein synthesis to site-specific conjugation
27-29 January 2020

Dr Arunabh Ghosh & Prof. Fouad Ghamouss
Towards Futuristic Energy Storage; paving its way through Supercapacitors, Li-ion batteries and beyond
22-24 January 2020

2019

Dr Yuri Dancik & Dr Franck Bonnier
Skin Models in Cosmetic Science: Bridging Established Methods and Novel Technologies
2 - 4 December 2019

Dr Eric Robert, Dr Jean-Michel Pouvesle & Dr Catherine Grillon
International Meeting on Plasma Cosmetic Science
25-27 November 2019

Prof. Richard Freedman & Prof. Philippe Vendrix
Counterpoints: Renaissance Music and Scholarly Debate in the Digital Domain
14-16 November 2019

Prof. Manuela Simoni, Dr Frédéric Jean-Alphonse, Dr Pascale Crépieux & Dr Eric Reiter
Targeting GPCR to generate life, preserve the environment and improve animal breeding: technological and pharmaco logical challenges
16-18 October 2019

Prof. Akkihebbal Ravishankara & Dr Abdelwahid Mellouki
Climate, air quality and health: long-term goals and near-term actions
28 June 2019

Dr Wolfram Kloppmann
N and P cycling in catchments: How can isotopes guide water resources management?
18 June 2019

Dr Carmen Díaz Orozco & Dr Brigitte Natanson
Forging glances.
Images and visual cultures in XIXth century Latin America
28-29 May 2019

DrTijen & Dr Gülçin Erdi
Rebel streets : urban space, art, and social movements
28 - 29 May 2019

Dr Marcelo Lorenzo & Prof. Claudio Lazzari
New avenues for the behavioral manipulation of disease vectors
21-23 May 2019

Dr Agnieszka Synowiec & Dr Christophe Hano
Biological Activities of Essential Oils
13-15 May 2019

Prof. Yiming Chen & Prof. Driss Boutat
2019 International Conference on Fractional Calculus Theory and Applications (ICFCTA 2019)
25-26 April 2019

Prof. Temenuga Trifonova & Prof. Raphaële Bertho
On the Ruins and Margins of European Identity in Cinema: European Identity in the Era of Mass Migration
2-3 April 2019

Dr Patrizia Carmassi & Prof. Jean-Patrice Boudet
Time and Science in the Liber Floridus of Lambert of Saint-Omer
27-28 March 2019

Dr Guillermina Dalla-Salda & Dr Philippe Rozenberg
Adapting forest ecosystems and wood products to biotic and abiotic stress
12-15 March 2019

Dr Vincent Courdavault & Prof. Nathalie Guivarc'h
Refactoring Monoterpenoid Indole Alkaloid Biosynthesis in Microbial Cell Factories (MIAMi)
5-6 February 2019

Dr Denis Reis de Assis & Prof. Hélène Blasco
Induced Pluripotent Stem Cells (iPSCs): From Disease Models to Mini-Organs
28-30 January 2019

2018

Prof. Igor Lima Maldonado & Prof. Christophe Destrieux
Frontiers in Connectivity: Exploring and Dissecting the Cerebral White Matter
5-6 December 2018

Dr Marius Secula, Prof. Christine Vautrin-Ul & Dr Benoît Cagnon
Water micropollutants: from detection to removal
26-28 November 2018

Prof. Guoxian Chen & Prof. Magali Ribot
Balance laws in fluid mechanics, geophysics, biology (theory, computation, and application)
19-21 November 2018

Dr Volodymyr Sukach & Prof. Isabelle Gillaizeau
Progress in Organofluorine Chemistry
15-17 October 2018

Jens Christian Moesgaard, Prof. Marc Bompaire, Bruno Foucray & Dr Guillaume Sarah
Coins and currency in the 10th and 11th centuries: issuing authorities, political powers, economic influences
11-12 October 2018

Dr Norinne Lacerda-Queiroz & Dr Valérie Quesniaux
Malaria - Current status and challenges
27-28 September 2018

Dr Renaud Adam & Prof. Chiara Lastraioli
Lost in Renaissance
20-21 September 2018

Prof. Abdelwahid Mellouki & Dr Véronique Daële
The 6th Sino-French Joint Workshop on Atmospheric Environment
10-12 September 2018

Prof. Emre Erdem & Dr Guylaine Poulin-Vittrant
Frontiers in Nanomaterials for Energy Harvesting and Storage
27-29 August 2018

Prof. Graeme Boone & Prof. Philippe Vendrix
Affective horizons of 'song' in the long fifteenth century
27-28 June 2018

Prof. Bilal Haider Abbasi, Prof. Nathalie Guivarc'h & Dr Christophe Hano
Modern aspects of Plant in Vitro Technology
27 June 2018

Prof. Marek Łos & Dr Catherine Grillon
Stem cells & cancer stem cells: Regenerative medicine and cancer
11-13 June 2018

Dr Ewa Łukaszyk & Prof. Marie-Luce Demonet
Transcultural Mediterranean: in search of non-orthodox and non-hegemonic universalism(s)
30-31 May 2018

Prof. Vladimir Shishov & Dr Philippe Rozenberg
Wood formation and tree adaptation to climate
23-25 May 2018

Dr Ján Žabka & Dr Christelle Briois
Advances in Space Mass Spectronometry for the Search of Extraterrestrial Signs of Life
16-18 May 2018

Dr Massimiliano Traversino Di Cristo & Prof. Paul-Alexis Mellet
From Wittenberg to Rome, and Beyond
Giordano Bruno: Will, Power, and Being
Law, Philosophy, and Theology in the Early Modern Era
26-27 April 2018

Dr William Horsnell & Dr Bernhard Ryffel
Neurotransmitters: non-neuronal functions and therapeutic opportunities
26-28 March 2018

Prof. Eric Goles & Prof. Nicolas Ollinger
Discrete Models of Complex Systems
19-21 March 2018

2017

Dr Kristina Djanashvili & Dr Éva Jakab Tóth
Is Multimodal Imaging an Invention with a Future? The Input of Chemistry
11-13 December 2017

Dr Emmanuel Saridakis & Dr Marc Boudvillain
Structural biology and biophysics of RNA-protein complexes
13-15 November 2017

Prof. Franco Pierno & Prof. Chiara Lastraioli
The Runaway Word. Languages and Religious Exile in the Renaissance
7-8 November 2017

Prof. Michiel Postema & Dr Ayache Bouakaz
Acoustic bubbles in therapy: recent advances with medical microbubbles, clouds and harmonic antibubbles
23-24 October 2017

Dr Mauro Simonato & Dr Jérôme Rousselet
Species spread in a warmer and globalized world
18-20 October 2017

Dr Sophie Heywood & Dr Cécile Boulaire
1968 and the boundaries of childhood
12-14 October 2017

Prof. Mihai Mutascu & Prof. Camelia Turcu
Globalization and growth in eurozone: new challenges
28-29 September 2017

Dr Mauro Manno & Prof. Richard Daniellou
The role of glycosylation on serpin biology and conformational disease
27-29 September 2017

Prof. Salvatore Magazù, Prof. Francesco Piazza, Dr Sivakumar Ponnurengam Malliappan, Dr Emilie Munnier
Recent advances in basic and applied science in cosmetics
3-5 July 2017

Dr Maria Clotilde Camboni & Prof. Chiara Lastraioli
The dynamics of the relationship with the more recent past in early modern Europe: between rejection and acknowledgement
20-22 June 2017

Dr Sohail Akhter & Prof. Chantal Pichon
Messenger RNA therapeutics: advances and perspectives
22-23 March 2017

Prof. Gary Gibbons & Prof. Sergey Solodukhin
GARYFEST: Gravitation, Solitons and Symmetries
22-24 March 2017

2016

Dr Mohammed Ayoub & Dr Eric Reiter
Antibodies Targeting GPCRs, Recent Advances and Therapeutic Challenges
24-25 November 2016

Prof. David Koester, Dr Bernard Buron & Dr Jean-Philippe Fouquet
Practical Engagements and the Social-Spatial Dimensions of the Post-Petroleum Future
7-9 November 2016

Dr Jorge Gutierrez & Dr Philippe Frank
Lipids, Nanotechnology and Cancer
10-12 October 2016

Dr Ferenc Kàlmàn & Dr Éva Jakab Tóth
Being Smart In Coordination Chemistry: Medical Applications
26-28 September 2016

Jean-Philippe Bouillon, Mourad Elhabiri, Jiri Kozelka, Laurent Plasseraud, Michèle Salmain & Eva Tóth, Roman Bulánek, Radek Cibulka, Michal Otyepka, Jan Preisler, Vladimír Šindelář & Irena Valterová
7th French-Czech "Vltava" Chemistry Meeting
Advancing Chemistry through Bilateral Collaboration
5-6 September 2016

Dr Satyajit Phadke, Dr Chandrasekaran & Prof. Mériem Anouti
Future strategies in electrochemical technologies for efficient energy utilisation
7-9 September 2016

Prof. Peter Bennett & Prof. Philippe Vendrix
Sacred/secular intersections in early-modern European ceremonial: Text, music, image and power
11-13 July 2016

Prof. Leandros Skaltsounis & Prof. Claire Elfakir
Olive Bioactives: applications and prospects
4-6 July 2016

Dr Mikhail Zubkov & Dr Maxim Chernodub
Condensed matter physics meets relativistic quantum field theory
13-15 June 2016

Prof. Brown-Grant, Dr Carmassi, Prof. Drossbach, Prof. Hedeman, Dr Turner & Prof. Ventura
Inscribing Knowledge on the Page: Sciences, Tradition, Transmission and Subversion in the Medieval Book
6-9 June 2016

Prof. Gary Gibbons & Prof. Sergey Solodukhin
Classical and quantum black holes
30-31 May 2016

2015

Dr Gyula Tircsó & Dr Éva Jakab Tóth
Medicinal flavor of metal complexes: diagnostic and therapeutic applications
7-9 December 2015

Prof. Erminia Ardissino & Dr Elise Boillet
Lay Readings of the Bible in Early Modern Europe
24-26 November 2015

Prof. Kathleen Campbell & Dr Frances Westall
Habitats and inhabitants on the early Earth and Mars
17-18 November 2015

Prof. Marion Harris & Dr David Giron
Insects, pathogens, and plant reprogramming: from effector molecules to ecology
5-7 October 2015

Dr Arayik Hambardzumyan & Dr Sylvie Bonnamy
Bioinspired molecular assemblies as protective and delivery systems
7-9 September 2015

Dr Peter Arensburger & Dr Yves Bigot
Analysis and Annotation of DNA Repeats and Dark Matter in Eukaryotic Genomes
8-10 July 2015

Prof. Scott Kroeker & Dr Pierre Florian
Nuclear Waste Disposal: Designing Materials For the End of Time
27-29 May 2015

Prof. Gary Gibbons & Prof. Sergey Solodukhin
Entanglement, Holography and Geometry
17 April 2015

Prof. Kari Astala & Dr Athanasios Batakis & Prof. Michel Zinsmeister
Conformal Methods in Analysis, Random Structures & Dynamics
12 April 2015

Prof. Kari Astala & Dr Athanasios Batakis
Loire Valley Workshop on Conformal Methods in Analysis, Random Structures & Dynamics
12-16 April 2015

2014

Dr Natalia Kirichenko & Dr Alain Roques
Insect invasions in a changing world
17-19 December 2014

Dr Alejandro Martinez & Dr Philippe Rozenberg
Natural and human-assisted adaptation of forests to climatic constraints: the relevance of interdisciplinary approaches
18-19 November 2014

Dr Magnus Williamson & Prof. Xavier Bisaro
Reconstructing Lost Spaces: acoustic, spatial, ceremonial contexts
30-31 October 2014

Dr Edouard Asselin & Dr Patrick D'Hugues
Copper, a strategic metal? The present and future of resources, processing and recycling
14-15 October 2014

Dr C. Oshman & Dr G. Poulin-Vittrant
Piezoelectric micro and nano-structures and their applications
25-26 September 2014

Dr Eric Reiter
3rd International Congress on Gonadotropins & Receptors - ICGRIII
7-10 September 2014

Dr Robin Beech & Dr Cédric Neveu
NemaTours: bringing worms together
17-18 July 2014

Prof. Gary Gibbons & Prof. Sergey Solodukhin
Gravitation, Solitons & Symmetries
20-23 May 2014

Dr Charles Sennoga & Dr Ayache Bouakaz
Targeted ultrasound contrast maging and drug delivery
19-20 May 2014

Dr Igor Leontyev & Dr Louis Hennet
Heterogeneous catalysis : recent advances in preparation and characterization
31 March - 1 April 2014

2013

Prof. Chandani Lokuge & Prof. Trevor Harris
Postcolonialism now
4-5 February 2013

Dr Fabrizio Gherardi & Dr Pascal Audigane
Geochemical reactivity in CO_2 geological storage sites, advances in optimizing injectivity, assessing storage capacity and minimizing environmental impacts
25-26 February 2013

Prof. Marcos Horacio Pereira & Prof. Claudio Lazzari
Vector-borne diseases : a multidisciplinary approach
8-9 April 2013

Prof. Marc Hillmyer & Prof. Christophe Sinturel
Bottom-up approaches to Nanotechnology
29-31 May 2013

Dr Svetlana Eliseeva & Prof. Stéphane Petoud
Lanthanide-based compounds : from chemical design to applications
11-12 July 2013

Prof. Pietro Roccasecca & Prof. Philippe Vendrix
Vision and image-making : constructing the visible and seeing as understanding
13-14 September 2013

Prof. Reuben Ramphal & Prof. Mustapha Si-Tahar
Chronic inflammatory lung diseases : The next-generation therapeutic targets to consider
20-21 September 2013

Prof. Sergey Traytak & Prof. Francesco Piazza
Macromolecular crowding effects in cell biology : models and experiments
24-25 October 2013

Prof. Mourad Bellasoued & Prof. Le Rousseau
Biology and mathematical inverse problems : a new wedded couple ?
14-15 November 2013

2012

Dr Lidewij Tummers & Prof. Sylvette Denèfle
Co-housing : born out of need or new ways of living ?
12-14 March 2012

Prof. Clive Oppenheimer & Dr Bruno Scaillet
Mount erebus, antarctica : an exceptional laboratory volcano
15-16 March 2012

Prof. Friedrich Wellmer
Life and innovation cycles in the field of raw material supply and demand — a transdisciplinary approach
19-20 April 2012

Dr Gerard Klaver, Dr Emmanuelle Petelet & Dr Philippe Negrel
Rare earth elements in our environment from ores towards recycling through the continental cycle
10-11 May 2012

Prof. Rosalind Brown-Grant & Prof. Bernard Ribémont
Textual and visual representations of power and justice in medieval manuscript culture
5-6 July 2012

Dr Agata Matejuk & Prof. Claudine Kieda
Defeating Cancer Can non coding small RNAs be new players ?
24-25 September 2012

2011

Prof. Nicola Fazzalari & Prof. Claude-Laurent Benhamou
Osteocyte Imaging
13-14 January 2011

Prof. Nikolay Nenovsky & Prof. Patrick Villieu
Europe and the Balkans : economic integration, challenges and solutions
3-4 February 2011

Prof. Salvatore Magazù & Dr Louis Hennet
Cosmetics and Pharmaceutics : New trends in Biophysical Approaches
14-15 February 2011

Prof. Irène Garcia-Gabay & Dr Valérie Quesniaux
Inflammatory and infectious diseases
30-31 May 2011

Prof. Ali Chamseddine, Prof. Alain Connes & Prof. Mickaël Volkov
Non commutative geometry, strings and gravity
25-27 May 2011

Prof. Jinglin You & Dr Patrick Simon
In situ Molecular Spectroscopic Technique and Application
20-21 June 2011

Prof. Valery Terwilliger & Dr Jérémy Jacob
Hydrogen isotopes as environmental recorders
15-16 September 2011

Prof. Philip Weller & Prof. Philippe Vendrix
Mystères des voix perdues – Polyphonies reconstituées, 1420-1520
24-30 October 2011

Prof. John Brady & Prof. Marie-Louise Saboungi
Water in biological systems
5-6 December 2011

2010

Prof. Alfredo Ulloa Aguirre & Dr Eric Reiter
New directions in gonadotropin hormones and their receptors
3-4 June 2010

Dr Yossi Maurey & Dr Christine Bousquet-Labouérie
Sacred space, sacred memory : bishop saints and their cities
10-12 June 2010

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