



NEWSLETTER

ASIA-PACIFIC ASSOCIATION OF CHEMICAL ECOLOGISTS

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To Our Readers

We are happy to inform you that the new issue of our APACE Newsletter is ready! In this issue, we begin with a welcoming note from our new president Dr. Guirong Wang. We then bring you back to our happy 2019 APACE Conference that took place in beautiful Hangzhou, China with a brief report and some memorable pictures. We are also reminded of the joint ISCE/APACE meeting that will take place in August this year. We are also proud to announce the recipients of the prestigious 2021 APACE Lifetime Achievement Award Winner (Dr. Alex Il'ichev) as well as of the first (2019, Dr. Aijun Zhang) and second (2021, Dr. Junwei Zhu) APACE Applied Chemical Ecology Winners. The APACE new councilors are also introduced in this issue.

Yonggen Lou

Editor/APACE Secretary
Institute of Insect Sciences
Zhejiang University, Hangzhou, China



Message from the President

Dear APACE members,

I would like to briefly introduce myself as the new president of the Asia-Pacific Association of Chemical Ecologists (APACE). I am a leader of innovation research group of bio-insecticide creation and application of Institute of Plant Protection, Chinese Academy of Agricultural Sciences. I have been engaged in the study of insect chemical ecology and functional genomics for twenty years. My research interests include insect chemical ecology, molecular basis of olfaction in insects as well as interaction between insects and host plants. I look forward to meeting you in the coming 3rd APACE-ISCE joint meeting in Kuala Lumpur, Malaysia.

Guirong Wang

Professor
Institute of Plant Protection
Chinese Academy of Agricultural Sciences



2019 APACE CONFERENCE

The 10th Conference of Asia-Pacific Association of Chemical Ecologists (APACE) was successfully completed in Hangzhou, Zhejiang, China. The meeting was co-organized by seven institutes including Zhejiang University, China Jiliang University, Tea Research Institute of Chinese Academy of Agricultural Sciences (CAAS), State Key Laboratory for Biology of Plant Diseases and Insect Pests of CAAS, Zhejiang Agriculture and Forestry University, APACE and the Professional Committee of Chemical Ecology of China with a theme "Chemical Ecology: deciphering the nature of life interactions". The opening ceremony of the conference was presided over by Prof. Yonggen Lou from Zhejiang University, President of the Chinese Association of Chemical Ecologists. Prof. Shusheng Liu, Deputy President of Academic Committee of Zhejiang University and Prof. Junji Takabayashi from Kyoto University, Japan, President of APACE, delivered welcome addresses on behalf of Zhejiang university and APACE, respectively. The president of the International Society of Chemical Ecology (ISCE), Prof. Jerry Zhu, brought best wishes from the ISCE. A total of 309 delegates from 23 countries all over the world attended the meeting.

The meeting was chaired by Prof. Junji Takabayashi as the chairman of the academic committee, and Profs. Jerry Zhu and Yongping Huang, acting as Co-chairs. The Lifetime Achievement award of APACE2019 were presented to the formal APACE president (6th), Dr. Eric Jang, a retired research entomologist from Agriculture Research Service, United States Department of Agriculture. This year's Young Scientist award winner was Prof. Naiyong Liu, Southwest Forestry University. Both presented award lectures entitled "Back to the future: bugs, baits, and toilet paper" and "Lepidopteran chemosensory gene repertoires: annotation, evolution and functional perspectives", respectively. Seven elite researchers in the field of chemical ecology, Prof. Ian T. Baldwin from Max-Planck Institute for Chemical Ecology, Germany, Prof. Christer Löfstedt from Lund University, Sweden, Prof. Ted Turlings from University of Neuchâtel, Switzerland, Prof. Myron Zalucki from The University of Queensland, Australia, Prof. Naoki Mori from Kyoto University, Japan, Prof. Matthias Erb from University of Bern, Switzerland and Prof. Yongping Huang were invited to give plenary lectures.

The conference had 13 scientific symposia, such as "Signaling and perception in plant-herbivore interactions", "Molecular mechanism of pheromone detection in insects", "Chemical information flow among organisms", "Molecular chemical ecology" and "From basic science in chemical ecology to commercial pest control products: alternative semiochemical-based insect pest management" etc. About 162 chemical ecologists and chemical ecology graduate students were selected for oral presentation and 66 posters being on display. There was a special symposium was designed to celebrate one of founders of APACE, Prof. Kenji Mori, for his legendary chemical synthesis achievement in chemical ecology field. Prof. Mori passed away earlier this year.

The closing ceremony contained one of the most important events of the conference to present many awards to young chemical ecologists and graduate students and postdocs, which included Student Travel Awards (6), Student Oral presentation Awards (3) and Student poster Awards (3). Moreover, APACE also thanked certificates for the honorary members of APACE Council who had served APACE for of the last 4 years. To recognize the great efforts and achievements by the local organizers of the conference. APACE had presented leadership awards to Chairs, Prof. Lou Yonggen, Prof. Wang Guirong and Prof. Han Baoyu, as well as society appreciation awards to 6 co-organizers and the conference secretary. The meeting was elected new members of the Executive Committee of APACE; they are Guirong Wang (11th President), Alvin Hee (Vice President elected) and Yonggen Lou (Secretary). Finally, Prof. Alvin Hee from Malaysia announced that the 11th conference of APACE (joint meeting with ISCE) will be held in 2021 in Putrajaya, Malaysia.

Student Travel Awards

Jin Ge (China)
Anna Chui-Ting Chieng (Malaysia)
Xiaoqing How (Sweden)
Peng Kuai (China)
Nanxia Fu (Germany)
Shun Yosano (Japan)



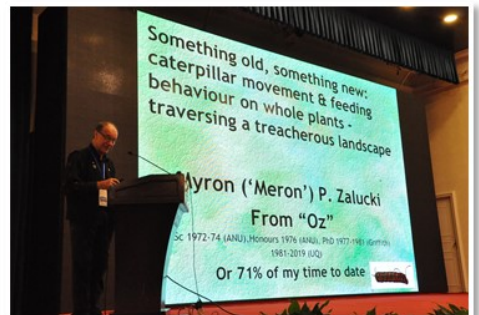
Oral/Poster Presentation Winners

Jingyuan Chen (Germany)	Nanxia Fu (Germany)
Shun Yosano (Japan)	So Nakano (Japan)
Xi Zhang (Switzerland)	Cuicui Xu (China)



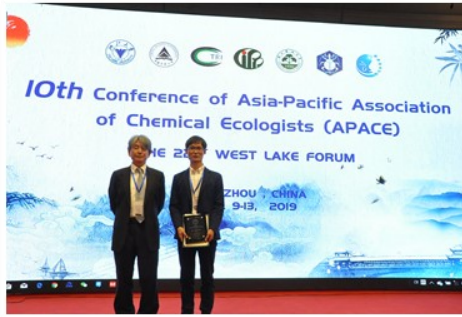


IMPRESSIONS OF HANGZHOU 2019





IMPRESSIONS OF HANGZHOU 2019





ISCE-APACE 3RD JOINT MEETING

2022 | August 8–12
Kuala Lumpur, Malaysia

An Invitation to the 2022 Joint Chemical Ecology Meeting in Malaysia

Dear Colleagues,

Since APACE's inception in 1997 and the inaugural conference that took place in Shanghai, China in 1999, APACE has grown to be one of the most prominent chemical ecology societies in the world alongside sister societies such as the International Society of Chemical Ecology (ISCE) and the Latin American Association of Chemical Ecology (ALAEQ). APACE has proudly achieved many milestones over the quarter of century notably continual support and recognition of younger chemical ecologists in graduate students and post-docs for APACE conference travels and achievements. APACE has also joined ISCE in having the prestigious Journal of Chemical Ecology as her official journal. Taking cognizance of the importance of fostering existing and building new networking ties amongst chemical ecologists in the world, joint meetings of ISCE and APACE have been successfully held in Melbourne, Australia and Kyoto, Japan in 2013 and 2017 respectively.

Following the success of the 10th APACE conference that took place in scenic Hangzhou, China in 2019, the 3rd Joint ISCE-APACE meeting that was due to take place in Putrajaya as the new capital of Malaysia was eagerly awaited by everyone. However, the unfortunate onslaught of the Covid-19 pandemic in early 2020 that continued till today resulted in cancellation of our 3rd Joint Meeting in 2021 due to global travel restrictions that were implemented to stem the tide of infections. Many international meetings too were cancelled or switched to virtual mode instead. However, in the last 2 ½ years, with great progress made in understanding the ways in which the SARS-CoV-2 virus worked, effective global vaccinations in coverage and booster take-ups have resulted in transitioning of Covid-19 to endemicity.

Thus, it is with great pleasure that we announce the call for registrations and abstracts, for the 3rd Joint Meeting of ISCE-APACE that will now be finally held in Kuala Lumpur, Malaysia from August 8-12, 2022. EQ Kuala Lumpur Hotel will be the official venue. The venue is in heart of the city that is very close to shopping, entertainment, food and transportation hubs. This will be the second time that Malaysia will play host to an auspicious gathering of chemical ecologists in the world after the 2001 APACE conference that took place in Penang. While it is acknowledged

that many countries including Malaysia has entirely opened her economy, international borders and not requiring any Covid-19 tests or insurance to be taken, travel restrictions and quarantine stays are still mandated in some countries.

Therefore, to accommodate as many chemical ecologists in the world as possible, the organising committee has designed this Joint Meeting to be a hybrid (mixed mode) with emphasis on in-person but supporting virtual (remote) participation as well.

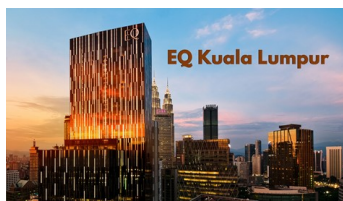
This Joint Meeting will showcase the many plenary talks, award, and memorial lectures plus exciting presentations in their respective symposium. We are extremely grateful to the many international sponsors for their contribution. This meeting is also supported by chemical ecologists in the organising and scientific committee coming from 18 countries.

In reflecting the current global scenario, the theme of our Joint Meeting is "Managing Sustainability in Challenging Times". Please visit our website www.isceapacejointmeeting.com for registration and abstract submission. You can also find information on who those great speakers are as well as how to sponsor the meeting! Do take the opportunity to register before **July 1, 2022**, to enjoy the discounted fees. Abstracts are due on **May 31, 2022** and room bookings for accommodation are on **July 8, 2022**. Please hurry to register and book your accommodation! Do not miss this great reunion opportunity!

Selamat Datang to Kuala Lumpur! Welcome to Kuala Lumpur!

Alvin KW Hee

Organising Chair of Joint ISCE-APACE Meeting
Department of Biology, Faculty of Science,
Universiti Putra Malaysia, 43400 UPM Serdang,
Selangor Darul Ehsan, Malaysia





AWARD WINNERS

ASIA-PACIFIC ASSOCIATION OF CHEMICAL ECOLOGISTS

The 2022 APACE Lifetime Achievement Award Winner Dr. Alex IL'ICHEV



Alex IL'ICHEV has extensive experience in Agricultural Entomology and applied Chemical Ecology with focus in pheromone and semiochemical based IPM in Horticulture. His field of expertise also includes an Area-Wide Mating Disruption applications for orchard pest control, Chemical and Behavioural Ecology of insects, Electrophysiology and Chemoreception of insects, Insect-Plant Interactions, Investigation of behaviour-modifying chemicals for insects and Economic Entomology.

Alex was a Councillor (2005-07) from Australia, Executive Treasurer (2007-09), Executive Secretary (2009-11), Vice-President (2011-13), and the President (2013-15) of the Asia-Pacific Association of Chemical Ecologists (APACE) and Councillor (2013-16) of International Society of Chemical Ecology (ISCE). He is also the Review Editor in the Editorial Board of *Frontiers in Ecology and Evolution*, *Chemical Ecology*. He has the honorary appointment as an Adjunct Professor in the Department of Entomology at Michigan State University (MSU), Michigan, USA. Alex published more than 180 scientific works, including 70 refereed scientific publications, where more than 110 works published in Australia and 70 scientific works published in the former USSR, including 4 books and 7 patents for sex pheromones of Lepidoptera.

The 2020 APACE Applied Chemical Ecology Award Winner Dr. Aijun Zhang



Aijun Zhang graduated in 1979 from Beijing Medical University, School of Pharmacy. He was first trained as an Organic Chemist in State University of New York-College of Environmental Science and Forestry (SUNY-CESF) and received his Ph.D. degree in 1992, and then trained as an Entomologist at Cornell University. He joined ARS, Invasive Insect Biocontrol and Behavior Laboratory in Beltsville, Maryland as

Research Chemist in 1998. Dr. Zhang is adjunct professor in Virginia Tech. His major research currently is in the fields of chemical ecology, electrophysiology, chemical synthesis, natural product, and integrated pest management. In 30 more years of research, Dr. Aijun Zhang has made important scientific breakthroughs in chemical ecology and natural product development which have had significant impact on both the world economy and public health. His chemical discoveries in semiochemical-based behavior modifying compounds toward insect pest management led to commercial products that are efficient, economical, sustainable, and environmentally friendly. He is an inventor of 25 U.S. and international patents, and many of his technologies have been commercialized by industrial companies and utilized by local farmers, U.S. government, as well as foreign action agencies. Dr. Zhang has regularly published research papers but has also actively helped scientists and managers in industrial companies during product commercialization. Dr. Zhang has had 5 major Cooperative Research Agreements and 8 Trust Agreements with commercial partners. Dr. Zhang's highly innovative research has had broad impact and has resulted in funding [PI (15) or co-PI (11)] from 26 outside agencies or industry totaling over \$14 million. Because of Dr. Zhang's pioneering work, several new natural products or semiochemicals for management of economically important pests have been made possible, e.g., Asian long-horned beetle (ALB), pink hibiscus mealybug (PHM), spotted wing drosophila (SWD), brown marmorated stink bug (BMSB), dogwood borer (DWB), oriental beetle (OB), and cocoa pod borer (CPB). Dr. Zhang's originality has also been shown by discovery of a green natural product (Methyl Benzoate, an FDA-approved food additive and alternative to methyl bromide) with activity for medically important insects that also works as an inexpensive and safe repellent/pesticide for human protection against blood-feeding/disease-vectoring arthropods such as mosquitoes, bed bugs, and ticks. Dr. Zhang has demonstrated the unique ability to develop the efficient pest management strategies using environmentally friendly semiochemicals for insect pest control (e.g., development of attract & kill strategy to control cocoa pod borer, push & pull strategy to control spotted wing drosophila fly, maturing disruption strategy to control the oriental beetle) to reduce or eliminate synthetic insecticide usage.

Because of his outstanding contributions to entomological



AWARD WINNERS

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research, Dr. Zhang has become a leading national and international authority in chemical ecology and natural product development. His scientific discoveries in semiochemicals have provided government agencies, industry, and academia efficient novel strategies to manage arthropod pests that pose severe risks to agriculture and public health worldwide. Dr. Zhang's achievements are evidenced by outstanding diverse research projects of native/invasive species for crop protection and frequent consultation activities of applications of his discoveries to manage different insect pests, as well as of application of novel natural insect repellent/pesticide for human protection, e.g., methyl benzoate (MB) and isolongifolenone (ISO), with professors and senior research scientists throughout world (more than 32 foreign countries, 94 institutes). During his research career, Dr. Zhang has collaborated with scientists from more than 30 countries, identified semiochemicals from more than 50 insect/plant species, and authored or co-authored 177 refereed publications (most significantly *Nature* and *PNAS*) in more than 50 different scientific journals, including 25 U.S. and international issued patents. Dr. Zhang's discovery has been featured in several media coverages including *ARS* research magazine and *C&EN News*, as well as many trade-journal, extension article, and popular publications, which has generated interest among growers as future treatment routes. Dr. Zhang has organized, been invited, and presented his research findings at over 100 national and international conferences, workshops, seminars, and symposia. Dr. Zhang's high productivity and remarkable ability to move his research out of the laboratory to the public through technology transfer is evidenced by 10 commercially available products currently on the market utilizing semiochemicals and/or green pesticides that he discovered to reduce/eliminate dependence upon synthetic pesticide-based control programs (see footnote*). These resulted in significant impact on agriculture and human health.

Dr. Zhang's landmark discoveries in semiochemical and natural product developments have pioneered the field and provided government agencies, industry, and academia novel strategies to manage arthropod pests. Dr. Zhang's tremendous scientific leadership is evidenced by citations of his personal achievements on methyl benzoate (MB) as a green pesticide and team achievement on lure development for brown marmorated stink bug (BMSB) in the USDA FY 2020 US President's budget request to Congress: as

well as frequent consultation activity with industry, government, and academia on Integrated Pest Management for utilizing natural products/semiochemicals for both crop and human protection. Because of his leading expertise in semiochemicals, Dr. Zhang was contacted by Animal and Plant Health Inspection Service (APHIS) to develop infestation detection and population monitoring tools to help prevent the invasive species, e.g., pink hibiscus mealybug (PHM), from invading the United State. His identification and discovery of the PHM sex pheromone and use of the trap he developed enabled APHIS to timely detect PHM infestation when it began to invade Florida. Dr. Zhang's achievement on identification and development of cocoa pod borer (CPB) semiochemicals have been critical for Malaysia, Indonesia, and Nigeria government agencies and the U.S. cocoa industry- which have used the pheromone and management tools that Dr Zhang developed as an alternative strategy to monitoring and control CPB to reduce usage of synthetic pesticides. Through invitations and funding received from 7 foreign institutions, Dr. Zhang has succeeded in 8 international site visits and helped to solve and resolve 6 significant insect pest problems. Dr. Zhang's worldwide scientific leadership has been further evidenced by his frequent consulting activities on diverse insect pest problems by e-mail, phone calls, and site visits worldwide; invitations to organize national and international conferences for application of semiochemicals in agriculture; review of scientific manuscripts for numerous scientific journals; Associate editorship and editorial board membership for four journals since 2009: *Environmental Entomology*, *Frontiers in Ecology and Evolution*, *Insects*, and *Scientific Reports*.

Current Commercial Products for Insect Pest Management Resulting from Dr. Zhang's Research:

1. Bark Beetle *Ips Pini* Pheromone and Application
2. Oriental Beetle Sex Pheromone and Application
3. Asian Long-horned Beetle Pheromone and Application
4. Cocoa Pod Borer Sex Pheromone and Application
5. Mosquito Repellent Isolongifolenone and Application
6. Dog Wood Borer Sex Pheromone and Application
7. Pink Hibiscus Mealybug Sex Pheromone and Application
8. Brown Marmorated Stink Bug Pheromone and Application
9. Spotted Wing *Drosophila* Attractant and Application
10. Green Pesticide Methyl Benzoate/Derivatives and Application



AWARD WINNERS

ASIA-PACIFIC ASSOCIATION OF CHEMICAL ECOLOGISTS

The 2022 APACE Applied Chemical Ecology Award Winner Dr. Junwei Zhu



Junwei (Jerry) Zhu is a Chemical Ecologist and Lead Research Entomologist in the Agroecosystem Management Research Unit, Agricultural Research Service, US Department of Agriculture, Lincoln, NE, USA. He is also an ADJ professor at the Department of Entomology, University of Nebraska, USA. He received his Ph.D. from Lund University, Sweden in 1995. After he

completed his postdoc training at the University of Kentucky in 1996, he became an assistant professor in the Department of Ecology, Lund University, Sweden. He joined the Department of Entomology at Iowa State University in 1999 as a research assistant professor and then was promoted to an associate scientist conducting research in semiochemical applications for integrated pest management. In 2002, he and other departmental faculty established a startup company, MSTRS Technologies, Inc., to use insect pheromone-based technologies for agricultural pest control, which significantly reduced the environmental pollution caused by the massive use of traditional pesticides practices. In 2003, he was appointed as the Chief Technology Officer and research director of the company. Under his leadership, the company had grown significantly. It had been awarded several SBIR awards from the National Science Foundation to develop novel technologies in pest control. The company was awarded the 2007 US National Tibbetts Award (40 companies selected from over 2400 US small businesses) and Iowa SBIR/STTR Most Innovative Award. He has received the Iowa State University Inventors Award twice for his innovation. In 2008, USDA-ARS offered him an opportunity to conduct research focusing on developing novel technologies to prevent and control blood-sucking insect attacks on livestock animals and humans.

Since he joined the USDA, he has provided scientific technology consultations and collaborations to develop innovative technologies in pest management with over twenty companies including Fortune 500 companies such as BASF, SC Johnson, Cargill, Zoetis/Pfizer, and numerous

US small businesses (ISCA Technologies, Inc., Onderings Lavender Farm LLC., APEX Bait Technologies, Inc., Insect-Pel Technology, Inc., Sterling International Inc., etc.), as well as several international pest control companies (Nitto Inc., Chemtica Inc., Phero-Bio. Ltd., etc.). In the past 5 years, his discoveries of natural product-based attractants and repellents have resulted in significant scholarly and industry recognition for practical application tool development to benefit agriculture and human well-being. Eight US patents including one PCT International application have been filed and granted with several commercial products sold in the pest control market. Dr. Zhu also helped many US small business companies apply for SBIR funding through NSF, DOD, and NIFA. He received the 2022 USDA-ARS Technology Transfer Award (Plain Area). He has also been awarded the OECD International Research Fellowship Award. Dr. Zhu has received millions of dollars in external funding from NSF, DOD-DWFP, NIFA, and industry partners to further innovation in entomology.

Dr. Zhu has published over 100 peer-reviewed journal articles since he stepped into the insect chemical ecology field. His recent discoveries in identifications of coconut oil-based medium-chain fatty acids and their derivatives' strong repellent activity with extended longevity against many blood-sucking insects have been reported in many leading newspapers, magazines, and TV programs. Their effectiveness against blood-sucking vectors is better and broader than the gold standard repellent (DEET), which is dominating the worldwide commercial repellent market. A high-impact paper "Better than DEET repellent compounds derived from coconut oil" was published in Nature's Scientific Reports and received the journal's Top 100 Paper (2018) with an Altmetric score of 294 (99%; ranked 1st of the 4th tracked articles in Scientific Reports among over 25000 published papers) and received recognition from over 28 news outlets worldwide. Several products in various repellent formulations from these findings (Starch-pectin coconut fatty acid biting fly repellent sprayable and coconut fatty acid mosquito repellent in lavender oil base) are produced and being used against stable flies, mosquitoes, and ticks. Additionally, he also served important roles in the Journal of Chemical Ecology (as one of 4 guest editors) for a special issue on semiochemical use in applied chemical ecology.



OFFICERS & COUNCILORS

ASIA-PACIFIC ASSOCIATION OF CHEMICAL ECOLOGISTS

11th APACE Officers (2019-2021)

- Conference: 11th APACE (Malaysia)
- Venue: Putrajaya, Malaysia 2021
- Host: Alvin Hee (Malaysia)
- President: Guirong Wang (China)
- Vice President: Alvin Hee (Malaysia)
- Secretary: Yonggen Lou (China)
- Treasurer: Dangsheng Liang (USA)



Becoming an APACE member? Have you renewed your APACE membership fees?

APACE fees are cheap, at only US\$20 for two years. Basically your fees are used to support the Association in a number of ways such as running of our official webpage (www.newapace.com) and promotion of chemical ecology particularly in support of students participation in our biennial meetings through regular student travel awards, and awards for the best student oral and poster presentations during the conferences. To subscribe to the Association, please visit the following webpage: www.newapace.com/members.html

APACE Councilors (2020-2024)

- Ayako Wada-Katsumata (USA)
- Dong Cha (USA)
- Koji Noge (Japan)
- Kye Chung Park (New Zealand)
- Le Van Vang (Vietnam)
- Shannon Olsson (USA)
- Wei Xu (Australia)
- Wen-Po Chuang (Taiwan, China)
- Xiang-Bo Kong (China)
- Xiao-Ling Sun (China)

APACE Councilors (2022-2026)

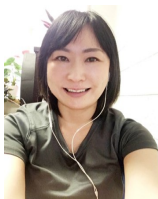
- Adriana Najjar-Rodriguez (New Zealand)
- Alexie Papanicolaou (Australia)
- Chuan-Kai Ho (Taiwan, China)
- Hajime Ono (Japan)
- Hong-Bo Jiang (China)
- Il-Kwon Park (Korea)
- Vivek Kempraj (India)



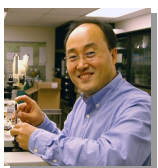
NEW COUNCILORS

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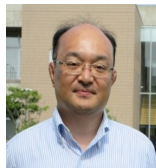
—APACE Councilors (2020-2024)—



Ayako Wada-Katsumata is a principal research scholar in the Department of Entomology and Plant Pathology, North Carolina State University. Insect behavior is strongly mediated by environmental cues including food chemicals, pheromones and bacterial metabolites. She is interested in how insects perceive chemical cues to exhibit various behaviors such as food choice, mating and aggregation, and how human-imposed strong selection pressures induce the rapid evolution in the behavior of pest species. One of her remarkable works is on "Glucose-aversion" in the German cockroach. As a perennial household pest with significant public health, and socio-economic impacts, the German cockroach has been the target of intense human-imposed selection with glucose-containing insecticide baits. In response, multiple cockroach populations rapidly evolved behavioral resistance to these baits in the form of glucose-aversion. By integrating Chemical ecology, Sensory ecology and Genetics, Dr. Wada-Katsumata and her colleagues revealed the neural mechanisms of gustatory system in Glucose-averse cockroach and suggested that this unique sensory polymorphism is an excellent model of rapid evolution of chemosensory-based behavior in the anthropogenic environment.



Dong Cha is a research biologist at USDA Agricultural Research Service located in Hilo, Hawaii, with specialization in insect chemical, behavioral, and microbial ecology. Cha received his PhD from Pennsylvania State University, and his current research focuses on developing behaviorally based integrated solutions in fruit fly and invasive pest management. He is involved with a variety of basic and applied research projects in collaboration with universities, government and regulatory agencies and private industry, and is currently serving as Subject Editor for Journal of Economic Entomology and Environmental Entomology.



Koji Noge is an Associate Professor at Akita Prefectural University, Japan. He received his PhD from Kyoto University in 2005 under the supervision of Profs. Yasumasa Kuwahara and Ritsuo Nishida. He was involved in molecular phylogenetic study of astigmatid mites and identification of a key enzyme in biosynthesis of the alarm pheromone of the astigmatid mite. Thereafter, he was a postdoctoral fellow in Dr. Naoki Mori's group at the same university followed by spending about two years as a postdoctoral research associate with Dr. Judith X. Becerra at University of Arizona. There he worked on herbivore-plant coevolution by combining molecular phylogenetics with chemical identification of plant secondary metabolites. He returned to Japan in 2009 as an Associate Professor at Akita Prefectural University. His main research focus is to understand the ecological and physiological roles of defensive and/or pheromonal volatiles released from heteropterans. He is now expanding his research interests to investigate the interaction between heteropteran species and their host plants. He also served as a local organizing committee of the 2nd Joint Meeting of ISCE-APACE in Kyoto, 2017.



Kye Chung Park is a research scientist with > 30 years of research experience on insect chemical ecology at Seoul National University (Korea), Natural Resources Institute (UK), Imperial College (UK), Iowa State University (USA), Pennsylvania State University (USA) and New Zealand Institute for Plant & Food Research (PFR, New Zealand). Kye Chung has been enjoying various research to understand chemical communication systems of insects with a focus on the physiological and behavioural function of peripheral chemosensory systems across a wide range of insects and their hosts. He is currently a team leader of the Semiochemistry & Electrophysiology Team at PFR. He is also serving as an associate editor for Physiological Entomology and Journal of Asia-Pacific Entomology and as a councillor for International Society of Chemical Ecology. He earned the 2020 Korea Entomology Award for his research achievement.



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Le Van Vang Bachelor degree in Agriculture, Can Tho University (CTU, Can Tho city, Vietnam) on March 1997. Working at the College of Agriculture, CTU from 1997-2000 as a research assistant in Entomology. Master degree in Agriculture at Tokyo University of Agriculture and Technology (TUAT, Tokyo, Japan) on March 2003. Master thesis: "Studies on the sex pheromones of lepidopterous species distributed in Japan and Vietnam: Identification, field evaluation and application for plant protection". PhD degree in Agriculture at TUAT on March 2006. PhD thesis: "Studies on the sex pheromones of lepidopterous species distributed in Japan and Vietnam: Identification, field evaluation and application for plant protection". Lecturer in Entomology at the College of Agriculture, CTU from 2006-2010. Japanese Society for the Promotion of Science (JSPS) postdoctoral fellow in Chemical Ecology at TUAT from 2010-2012. Lecturer in Entomology at the College of Agriculture, CTU from 2012-2014. Vice dean of the College of Agriculture, CTU from 2016-2018. Dean of the College of Agriculture, CTU from 2018-date.



Shannon Olsson is a chemical ecologist who listens to nature's chemical conversations across India's diverse ecosystems. A Fulbright Scholar, Ramanujan, and INK Fellow, Shannon's research has been featured by Science Magazine, CNN, The Telegraph, USA Today, Chemical and Engineering News, TEDx, Syntalk, Sci-Illustrate, Dublin Science Gallery, V&A Museum London, and the DST Science Express train, among others. Since 2014, Shannon has been a faculty member at the National Centre for Biological Sciences, Tata Institute of Fundamental Research. She is currently Global Director of the echo network, an international social innovation partnership with the specific focus of increasing scientific awareness, engagement, and insight regarding our ecosystems. Shannon is, among other pursuits, currently a co-PI in the Biodiversity Collaborative, a founding member of ECOBARI (Ecosystem-based Adaptation for Resilient Incomes) and Global Director of the echo network. She also serves through the echo network's international hub as Special Scientific Envoy to India with the Danish Academy of Technical Sciences (ATV) in close collaboration with the Danish Innovation Center in India (under the auspices of the MFA and the MHER).



Wei Xu is an insect chemical ecologist and his research focuses are on insect chemosensory system to improve our understanding of insect behaviors and insect-host interaction and evolution. He completed his BS and MS studies in Sun Yat-sen University in China. He received his PhD in the Department of Entomology at the University of California, Davis (UC Davis) in 2010 under the supervision of Professor Walter Leal. He came to Australia with an OCE (Office of the Chief Executive) Postdoctoral Fellowship and joined CSIRO Ecosystem Sciences (CES) in Canberra. His study focus is the molecular mechanisms of insect chemosensory genes and their functions in insect-host interaction. He joined Murdoch University in 2015 as a lecturer in Entomology. Currently he is leading a research group including seven PhD students and one M.S student. They are working on insect olfaction, biological control, native pollinators and insect-plant interactions. Their long-term goal is to develop more efficient and environmentally friendly strategies to manage pests and safeguard our ecosystem and biodiversity.



Wen-Po Chuang is currently an Associate Professor in the Department of Agronomy, National Taiwan University. He received his Ph.D. in the Department of Crop and Soil Sciences, Penn State University in 2012 and was a post-doctoral fellow in the Department of Entomology, Kansas State University from 2012 to 2014. His study focuses on the molecular mechanism of insect-resistant genes in crops (rice and corn) and the response of the insect-resistant traits under environmental stresses.



Xiang-Bo Kong graduated from the Institute of Zoology, Chinese Academy of Sciences with a Doctor of Science degree in 2002. Now he is also a member of the National Committee of Chemical Ecology and the Asia-Pacific Chemical Ecology Society. His main research interest is the chemical ecology of forest insects (e.g., *Dendrolimus* spp., *Ips* spp., and *Semanotus bifasciatus*), focusing on the trophic relationship between host, pest and natural enemy, the analysis and identification of the mechanism of volatile secondary metabolites from host plants on insects, and the chemical communication mechanism



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between male and female insects. In his research work, he is devoted to elucidating the structure, physiological, biochemical and ecological functions of semiochemicals by using GC-MS, wind tunnel, neurophysiology and chemical and molecular technique, etc., to develop an environmentally friendly integrated management technology for forest pests. To date, he has published more than 70 articles in academic journals at home and abroad, many of which have been awarded the Outstanding Scientific Paper Award by Entomological Society, Forestry Society and Chinese Society of Science and Technology. In addition, he was awarded the Outstanding Youth Award from Chinese Academy of Forestry in 2010 and the 11th Forestry Youth Science and Technology Award and Liang Xi Forestry Science and Technology Award in 2011.



Xiao-Ling Sun is a professor of Tea Research Institute of Chinese Academy of Agricultural Sciences in Hangzhou, China. Currently she is the council members of the Plant Protection Society (China) and the unit head of Insect Resistance Breeding Research Group in Tea Research Institute of CAAS. She

has published over 100 research papers in some high impact scientific journals, such as *Plant Physiology*, *Plant Cell and Environment*, *Horticultural Research* and *Phytochemistry*, etc. Moreover, she has received numerous national awards, with 13 patents granted from her research. She was the Vice Chair of the 2019 APACE meeting in Hangzhou.

Employment

Dr. Dangsheng Liang, president of Apex Bait Technologies, Inc. has received two research grants in 2022, one from USDA on developing a bait for snails and another from NIH on mosquito bait development. We are looking for chemical ecologists with a strong background in organic chemistry and/or insect behavior to join our endeavor.

—APACE Councilors (2022-2026)—



Adriana Najar-Rodriguez has more than 25 years of experience in Entomology and more than 15 years of experience in Chemical Ecology and biosecurity-related issues involving invasive insect species. Her experience includes working in Colombia, Australia, Europe (Switzerland and Germany) and New Zealand. Her investigations have addressed invasive insect pests (Lepidoptera, aphids and thrips), native insects and invasive weeds, and have concentrated on major agricultural markets including potatoes (Colombia), cotton (Australia), vegetables and summer and stone fruits (Switzerland), and on the forest industry. Topics covered by her research have included studies on olfactory-guided insect behavior, insect neurobiology in relation to processing of odor information by the insect brain, olfactory behavior genetics; effects of herbivory, growing season and plant genotype on plant volatiles and secondary metabolites production, effects of climate change on multitrophic interactions (plant-herbivore-parasitoid) mediated by plant chemistry (volatiles and secondary metabolites); effects of insect endosymbionts on host plant use and insect communication mediated by sound and chemistry.



Alexie Papanicolaou is a computational genome biologist working on agricultural and natural ecosystems. Alexie's main interest is creating new methods to address the broad evolutionary question of how organisms adapt to a changing environment. With a background in insect biology, especially chemosensation, Alexie's research delivers to the biosecurity sphere especially around food security. His current work is around the curation of molecular knowledge in this space, a key bottleneck to allow linking recent genomic technologies with trustworthy research outcomes.



Chuan-Kai Ho is a professor of Institute of Ecology and Evolutionary Biology of National Taiwan University. His research interests include plant-animal interactions under environmental changes in two categories: (1) *Basic research in ecology*—plant-animal interactions across spatial gradients and under



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climate warming. For example, his laboratory examines i) plant-herbivore interactions across latitude and altitude, ii) species interactions under climate warming (e.g., competition between native and invasive herbivores; plant-pollinator interactions), and iii) plasticity vs. genetic adaptation in species response to climate warming. (2) *Ecological applications*—plant-herbivore-predator interactions in agroecosystems. For example, his laboratory examines i) climate change impact (elevated temperature and CO₂) on crop performance, pest outbreaks, and biocontrol effectiveness, and ii) the temporal variation in biocontrol service in organic and conventional rice paddies. Overall, he enjoys brainstorming about interesting ecological ideas and experimental designs.



Hajime Ono is an Associate Professor in the Graduate School of Agriculture, Kyoto University. He obtained Ph.D. from Kyoto University, Japan, in 2000 by the study on chemical basis for host recognition of papilionid butterflies. He studied chemosensory mechanisms of papilionid butterflies at the JT biohistory hall, Japan (2000-2004) and subsequently the biosynthesis of the insect hormones at the University of Minnesota, USA (2004-2006) as a postdoctoral fellow. After establishing his laboratory in Japan (2007-), he has been studying insect endocrinology and chemosensory mechanisms using dipteran insects including *Drosophila* and *Bactrocera* species. Currently, he also focuses on bioactive chemicals underlying host shift using a leaf-mining moth in the view of chemical ecology.



Hong-Bo Jiang got his Ph. D degree at Southwest University, China in 2010. Later, he joined Dr. Yoonseong Park's lab in Kansas State University as a postdoctoral researcher focusing on the neurophysiology of the insect behavior. He returned to Southwest University as a faculty member in 2014. Since then, he has been interested in the molecular physiology and neurophysiology of the behaviors of in the oriental fruit fly (*Bactrocera dorsalis*), which is a destructive invasive insect pest for the vegetable and fruit industry worldwide. He is currently involved in the projects for exploring the molecular mechanism of the olfaction mediated behaviors such as plant volatile mediated oviposition, mating and foraging. Another interest of

his is the olfactory plasticity of the oriental fruit fly under various states (virgin or mated, fed or starved, healthy or pathogen infected). Furthermore, he is also obsessed to the olfactory signal processing in the brain of *B. dorsalis*. Especially, how this fly processed the olfactory cue of methyl eugenol resulted in the behavioral dimorphisms (only males are attracted) in different sexes.



Il-Kwon Park is a research scientist with > 20 years of research experience in forest insect pest management at Seoul National University (Republic of Korea) and the National Institute of Forest Science (Republic of Korea). Il-Kwon Park's first research interest is to identify forest insect pheromone. Our research team is now investigating the pheromones of several forest insect pests such as *Monochamus* species, bark beetles, pine shoot borer, peach pyralid moth, black pine bast scale, and cherry tree borer. Il-Kwon Park's second research interest is to isolate and identify natural compounds from plants with bioactivities such as insecticidal, antifungal, and nematocidal activity for the development of botanical pesticides.



Vivek Kempraj is a chemical ecologist from India. His research specializes in the chemical, microbial and behavioral ecology of tephritid fruit flies. Vivek serves as the CEO of Bioorgo, a semiochemical company in India, and led the pheromone and semiochemical division. He also worked as a Senior Research Associate at the Indian Institute of Horticultural Research. Vivek earned his PhD from Macquarie University, where he was an Australian Research Council (ARC) scholar, and a Master by Research degree in Biochemistry from University of Mumbai. He has published around ~50 research papers and book chapters. He also has few patents to his credits. Vivek recently joined Dr. Dong Cha's Lab as a Postdoctoral associate at PBARC, USDA. When he's not busy with research, he likes to paint and read books and spend time with his beautiful wife and 5-yr-old son.



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HIGHLIGHTS OF DR. AIJUN ZHANG'S TWO MAJOR PROFESSIONAL ACCOMPLISHMENTS

Dr. Zhang's discoveries on semiochemicals were major scientific breakthroughs in natural product chemistry

Dr. Zhang's unique research finding on the sex pheromone of female elephant was a novel scientific discovery in the field of mammalian chemical communication and constituted a highly significant contribution to a broad scientific understanding of the nature of the vertebrate pheromone and mammalian olfactory systems. It resulted in publications in *Nature* and *Chemical Science*, which were cited more than 300 times in subsequent studies on vomeronasal organ (VNO), an important part of the olfactory system in many animals from reptiles to horses. In addition, Dr. Zhang identified and synthesized many unique pheromone compounds, which were novel natural products never discovered before. For example, he discovered and identified the female sex pheromone of pink hibiscus mealybug (PHM) and developed innovative synthetic pathways to successfully synthesize all 12 optical pure isomers. Then, he developed a highly effective trapping system. One of the pheromone components (maconelliol) was the first ever discovered natural product in the world. It opened new avenues for study of a new class of compound in different fields. It has been listed by chemical search engine and chemical databases, e.g., Molbase, LookChem, CDT, as a building block to make different larger molecules used in different research fields in the world. Dr. Zhang also discovered, identified, and synthesized supellapyrone, the sex pheromone of the brown-banded cockroach. This compound was a chemically novel sex pheromone and constituted a new class of 3,5-dialkyl-substituted α -pyrone natural products. It is the only 5-alkyl- α -pyrone ever-discovered in nature. Moreover, Dr. Zhang identified, discovered, and synthesized lanierone, an overlooked pheromone synergist for the

pine engraver. This compound had never been found in nature before. Further, Dr. Zhang discovered, identified, and synthesized two male-specific compounds that were stimulatory beetle volatiles for an invasive species, Asian long horned beetle (ALB). These aggregation pheromones were chemically unusual natural products and were previously unknown from insects. Dr. Zhang's research findings were critical and resulted in significant impacts in chemical ecology and natural product fields for developing efficient alternative strategy in IPM program to protect agricultural and the environment.

Dr. Zhang's groundbreaking research on natural green pesticides/repellent provided novel strategies to manage arthropod pests that pose severe risks to agriculture and public health

Dr. Zhang discovered that methyl benzoate (MB) and its analogs, which exist naturally as floral fragrances in many plants and are used in shampoo/cosmetic products as well as in food and beverages (FDA approved food additive), were safe inexpensive insecticides that were 5 to 20 times more toxic than commonly used pyrethroid and organic commercial products available on the market against a broad range of agricultural and medical important arthropod pests, including, mosquitoes, ticks, bedbugs, fire ants, fruit flies, beetles, aphids, and nematodes. This new class of safe green insecticide can be used as fumigants and has been patented with foreign rights protection. Numerous national and international companies have expressed commercialization interests. One exclusive license (AgroSource, Inc.) has been issued. Dr. Zhang also discovered that a natural product, isolongifolenone and its analogs, could effectively repel blood-feeding arthropods and then developed an efficient method to synthesize it. Dr. Zhang demonstrated that (–)-isolongifolenone deterred the biting of the yellow fever mosquitoes, *Aedes aegypti* and a mosquito vector of malaria, *Anopheles stephensi*, more effectively than the widely used synthetic chemical



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repellent, DEET, in laboratory bioassays. The compound also repelled blacklegged ticks and lone star ticks as effectively as DEET. The technology has resulted in two U.S. patents with foreign rights protected and has been licensed by a company for commercialization. Dr. Zhang's discovery has been featured in several popular publications. The accomplishment titled "Discovery of A New Class of Safer Insecticides" has been cited in the USDA FY 2020 US President's budget request to Congress. Dr. Zhang's achievements have paved the way for utilizing the natural-green products as a DEET alternative for human protection against blood-feeding arthropods, which are important pathogen vectors and cause a variety of human diseases.

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