

**FEDERATION OF ASIAN & OCEANIA
PEST MANAGERS ASSOCIATIONS**

MAGAZINE

APRIL 2019

The Future of the Pest Control Industry?

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An Uncertain Future...

We live in a rapidly changing world and I am sure that I do not need to tell you that! But where is the world of pest control heading to the future and what are some of the many challenges that lie ahead for the industry?

These questions are the focus of two of our feature articles, one by former FAOPMA President, David Gay OAM, and the other by Asia's leading urban pest researcher, Prof. Chow-Yang Lee. These articles are a summary of the keynote presentations from the last two FOAPMA-Pest Summit meetings. In the case of David, he discusses how customers will seek out pest managers in the future, in what he calls the 'Uber Effect'. Chow-Yang reviews the many and varied challenges to the industry within Asia, from the increasing demand in pest management services, to the new threats, to arguably the most difficult aspect of all, human resources. There is the question of how the industry will find staff to the future, and more importantly, retain the leaders.

Interestingly, many of the challenges are mirrored in this issue's *Insights from an Industry Icon*. Nancy Lee is a trail blazer; in an industry that is so male dominated, Nancy has excelled where so many have faltered. Nancy and her business, Chung Hsi Chemicals, provides a model that others can only emulate. One of the key factors that Nancy highlights in order to survive to the future, is knowledge. As we say, knowledge is power, and this issue promotes many of the key events ahead.

Without a question for the Asia-Pacific Region, the most important (and largest) meeting is FAOPMA-Pest Summit. This is being held in Daejeon, Korea over 24-27 September 2019. There are five pages devoted within this issue to the meeting, and the scientific session is going to be fantastic. The line up of speakers include a number of industry greats including, Brian Forschler, Bill Robinson, Jennifer McCaw, Erik Meurling, Scotty Yang, plus the two editors of this magazine. This is a meeting not to be missed and I am looking forward to seeing you in September.

Also included in this issue is a feature article on *Drosophila* (Vinegar flies) as vectors of food-borne illnesses. There is a story on the editor's experience in finding bed bugs in hotel rooms, plus an unusual story that attempts to demonstrate what a mosquito looks like to another mosquito - you may be surprised.

The book reviewed, *The Secret Lives of Flies*, is in my opinion, one of the most fascinating entomological texts that I have read to date, and can be thoroughly recommended.

The news section is especially comprehensive in this issue. One common theme is food contamination and how quickly social media can damage reputations.

Finally, did you guess what last month's pest was? The answer is forthcoming, along with a fact sheet on this pest. Another is included to challenge your taxonomic skills! ■

Stephen Doggett (Chief Editor)

Cooperation and a Win-Win Mentality

Message from Mdm Huang Xiaoyun, President FAOPMA



There is an old Chinese saying: “if you give away roses, your hands would smell like roses.”
Looking at history of human kind, competition

has always been a somewhat cruel topic. Society’s drive for moving forward wouldn’t have been possible without competition, but are we destined to be a self-serving species while engaging in competition? If you ever played the game of Tetris, you would understand the fact that in order to be successful in this game, we need to be able to identify the matching pieces of puzzles in various length and shapes falling from the top of the screen “competing” for space, and put them in the right place to form the perfect shape. The rules of this game also should be applied to our everyday lives.

An old and hardworking fruit farmer spent decades on cultivating a new variant of fruit tree that produced a higher yield and was quite successful in achieving his goal. Interestingly, he didn’t keep his new trees a secret, instead, he gave them away to the neighbouring farmers. Under his guidance, the entire village was planting his tree. People were befuddled by his generous acts and asked him why he didn’t want to keep it a secret and seemingly gave away his competitive advantage. His reply? “I am doing this for my own good. Think about it, if the neighbouring farmers were still planting the old fruit trees, my trees will be pollinized by the inferior trees, and why would I want that?” His words made people realize that not only he was able to keep his trees as productive as he intended them to be, he also helped his neighbours. In working with your competitors to make progress, isn’t this a wise way to win?

The founding of FAOPMA, the revamping of our wonderful magazine, and the annual FAOPMA-Pest Summit, are all parts of the efforts in building

a platform to cooperate and work with one another in order to win. The goal of this platform is for our industry to interact, understand, and learn from one another. This platform shall bring new ways of thinking, innovative ideas, and cutting-edge research and technologies to everyone in the region to create synergies to move the industry to the next level. This platform should also serve as a forum in which we could all get together to form new friendship, and forge a productive fellowship to plan for the future challenges. In another word, this is a platform of cooperation with a win-win mentality.

We all understand the important role cooperation played in the past, such as the integration of FAOPMA and Pest Summit, but it is ever more imperative moving forward. With an increasing level of globalization and the ever-tighter interdependence of various markets, cooperation and joint-development becomes a basic requirement of our times. The merger of capital and technology and exchange of ideas and culture are touching our everyday lives. There are incredible potentials in the sharing of industry and technical standards, service philosophy, and management expertise. This will bring us new experiences, better efficiency, improved professionalism and more opportunities for development. This will also create a healthy environment in which our diversity of people and culture will shine and flourish. Cooperation should not only happen at an international level, it is even more important at an individual level. Cooperation allows us to learn from others and overcome our own shortcomings. Cooperation will pull us closer together and turn competitors into friends.

Cooperation = Win-Win. Let’s compete with a smile of confidence and sincerity, and grow together! ■

www.faopma2019korea.org



FAOPMA-Pest Summit 2019 Daejeon, Korea

24(Tue) – 27(Fri) September, 2019
Daejeon Convention Center (DCC), Daejeon, Korea

INVITATION



Dear Sir/Madam

The FAOPMA-Pest Summit 2019 will be held in Daejeon, Korea, which is the center of science that leads national administration, traffic and the 4th industrial revolution, 24 - 27 September, 2019.

During the FAOPMA-Pest Summit 2019, the latest researches on pest management and disease control, exhibitions and social events for promoting and achieving the advancement of related industries are to be demonstrated.

Your attention and participation to the FAOPMA-Pest Summit 2019 Daejeon, Korea would be warmly welcomed and appreciated more than ever.

Sincerely,
General Chair of FAOPMA-Pest Summit 2019 Daejeon
Korea Organizing Committee
Won Soo Hong





Again, FAOPMA-Pest Summit in KOREA!

The Federation of Asian and Oceania Pest Managers' Association – was founded with the common goal of advancing the pest management industry throughout the region. For many years, FAOPMA has had the privilege of being associated with many great conferences throughout the region, and has facilitated through the FAOPMA 'spirit', many great and lasting friendships amongst industry leaders and supporters from both within the region and globally. In Korea, FAOPMA-Pest Summit 2013 was held in Seoul.

Overview of FAOPMA 2019

TITLE FAOPMA-Pest Summit 2019 (Daejeon, Korea)
DATE Summit) 24(Tue) - 27(Fri) September, 2019
 Exhibition) 24(Tue) - 26(Thu) September, 2019
VANUE Daejeon Convention Center(DCC), Daejeon, Korea
ORGANIZED BY



KPCA (Korea Pest Control Association)

IN ASSOCIATION WITH



Federation of Asian & Oceania Pest Managers Association

Theme ONE HEALTH

PROGRAMS

EXCO, AGM, Welcome Reception, Keynote Speech, Luncheon, Banquet, Exhibition, Tours, AIB training

※ Infectious disease vector exhibition by KCDC (Korea Center for Disease Control & Prevention)

PARTICIPANTS

6,000 delegates (Domestic participants: 5,000 delegates, International participants: 1,000 delegates)

※ KCDC, public administrators of pest management department from national states, provinces, cities, military prevention of epidemics, industrial leaders and professionals, students and professionals from academic societies, relating enterprises (Pest management product, drugs, chemicals)

Session

- I **[Keynote]** Infectious Diseases and One-Health
- II Surveillance, Prevention and Control of Vector-borne Diseases
- III Pest Control on Livestock, Pets, Wild Animals and Quarantine
- IV Climate Change Response and the Importance of Natural Ecosystem
- V Antimicrobial Resistance(AMR) and One Health
- VI Zoonosis: Changes and New Emergence
- VII Cases of Pest Control/Management & PCO Safety

Program at a glance

Date & Time	September 24 (Tue)	September 25 (Wed)	September 26 (Thu)	September 27 (Fri)
09:00	Registration	Registration	Registration	Registration
10:00		Exhibition Opening	Scientific Session 4	AIB Training 1
11:00		Opening Ceremony	Coffee Break	
12:00		Keynote Speech	Scientific Session 5	
13:00	EXCO	Lunch	Lunch	Lunch
14:00		Scientific Session 2	Scientific Session 6	AIB Training 2
15:00		Coffee Break	Coffee Break	
16:00		Scientific Session 3	Scientific Session 7	
17:00	-	Exhibition	Exhibition	Full day & Half day Sight Seeing TOUR
Evening	Welcome Reception	Gala Dinner	Closing Ceremony	

AIB training

※ A certificate will be given to who passes the test after the training

※ The program is different from previous FAOPMA summit from 2017 and 2018



Speakers



William H. Robinson

Urban Pest Control Research & Consulting
U.S.A.



Brian T. Forschler

Georgia University
U.S.A.



Stephen L. Doggett

Westmead Hospital, NSW Health Pathology,
Department of Medical Entomology
Australia



How Yee Fatt

Bentz Jaz Singapore Pte Ltd
Singapore



Jennifer McCaw

Biogen AG
Germany



Erik Meurling

Anticimex International
Sweden



David Lilly

Ecolab
Australia



Chin-Cheng Scotty Yang

Kyoto University
Japan



Gu Xiang

Shanghai Minder Environmental Hygiene
Service Co. Ltd.
China

TO BE UPDATED

Official Programs

Opening Ceremony

- Date: September 25, 2019 (Wednesday) / 10:00 ~ 10:30
- Place: Grand Ballroom, 2F, Daejeon Convention Center (DCC)
- Attendees: Registered participants

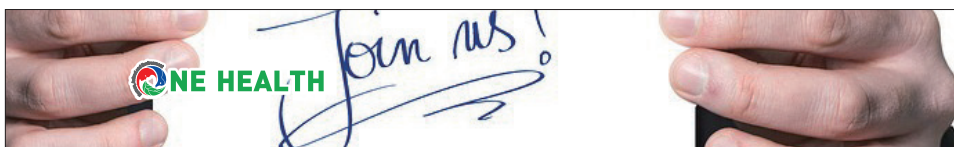
Closing Ceremony

- Date: September 26, 2019 (Thursday) / 17:30 ~ 18:00
- Place: Grand Ballroom, 2F, Daejeon Convention Center (DCC)
- Attendees: Registered participants

Gala Dinner



- Date: September 25, 2019 (Wednesday) / 19:00 ~ 21:00
 - Place: Grand Ballroom, 2F, Daejeon Convention Center (DCC)
 - Attendees: Registered participants and Accompanying persons who made registration
- ※ Official programs are subject to change



Registration Fees

FAOPMA 2019	Early-bird Registration (By May 31, 2019)	Pre-registration (June 1st ~ August 31, 2019)	On-site Registration
Regular registration	\$350.00	\$400.00	\$500.00
Group registration (10 – 29)	\$320.00	\$350.00	\$450.00
Group registration (over 30)	\$300.00	\$330.00	\$400.00

AIB training fees

FAOPMA 2019	Pre-registration (By August 31, 2019)	On-site Registration
Overseas participants	\$200.00	\$250.00

※ For group registration and application for AIB training, please contact the FAOPMA 2019 secretariat
 ※ Registration would be complete once you receive confirmation mail from the FAOPMA 2019 secretariat

Payment Information

Account Holder: KOREA PEST CONTROL ASSOCIATION
 Account Number: 033-556164-01-010
 Bank Address: 79, EULJI-RO, JUNG-GU, SEOUL, SOUTH KOREA

Bank Name: Industrial Bank of Korea
 SWIFT/BIC Code: IBKOKRSE / IBKOKRSEXXX

※ For credit card payment, please visit our website

Secretariat of FAOPMA-Pest Summit 2019 Registration

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Exhibition

Date: 24(Tue) - 26(Thu) September, 2019

Place: 1F Exhibition Hall, DCC (Daejeon Convention Center)

Benefits of FAOPMA 2019 Exhibition

1. Unique opportunities to meet the key personnel in prevention of epidemics from over 70 countries at one place
2. A key to success for building and expanding business toward global market
3. The best promotion place for enhancing your brand image to global leaders and buyers from pest control industries

Exhibition fees

Type	Early Bird(~ 30 Jun.)	Normal Registration(~1, Sep.)
Premium	USD 3,500	USD 5,000
Standard	USD 2,500	USD 3,000
Space only	USD 2,000	USD 2,500

※ One Exhibitor Pass per booth will be provided

※ Booth location will be assigned based on First Come, First Served by deposit



Cultural Tour

Date: 25(Wed) - 27(Fri) September, 2019

Packages: Paekche Cultural heritage / Jeonju Hanok village

※ Optional Tour for every registrants of FAOPMA 2019

Course

Course1. Paekche Cultural heritage in Gongju

Listed as a UNESCO World Heritage Site, the historical uniqueness and cultures can be found in Gongju (Optional tour for registrants)



Course2. Jeonju Hanok village (24 September, 2019)

With various street foods and activities, Jeonju reflects both traditional and modern aspects of Korea(AGM Participants)



Technical Tour of FAOPMA 2019



KCDC Infectious disease vector exhibition



CESCO Service Simulation Center

An environmental hygiene place where CESCO's advanced scientific knowledge and infrastructure are displayed



※ Technical Tour will be continued after the cultural Tour

The host country FAOPMA 2019, Korea



Heritage of 5,000 year's of history

K-Pop, the new global sensation



Various Foods of Korea

The host city, Daejeon City 대전광역시

DAEJEON METROPOLITAN CITY

Located in the center of Korea, Daejeon city is the hub of national traffic, that leads 4th industrial revolution with more than 200 R&D organizations, universities, enterprises and the government offices.



Secretariat of FAOPMA-Pest Summit 2019 Registration

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Nancy Lee

Insights from an industry icon

Interview by Stephen L. Doggett



In a industry that is so male dominated, few women have succeeded in the way that Nancy Lee has.

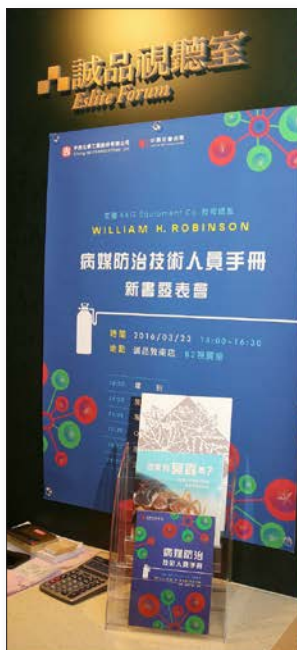
Nancy is an inspiration to all women who follow in her steps.

Nancy Lee is the general manager of Chung Hsi Chemical, the Executive Director of the Taiwan Environmental Pest Management Association and the Taipei Pest Control Association. However, sometimes

Nancy likes to call herself 'Allis's special assistant' (Allis is Nancy's daughter and they work together as a team).

HOW MANY YEARS HAVE YOU BEEN IN THE PEST CONTROL INDUSTRY?

I have been working in the industry for over 35 years. At the beginning when I joined the company, I started with accounting and began learning at the exportation department.



"The Service Technician's Field Manual" was written by Dr. William Robinson, translated and published by Chung Hsi. This is the first PCO technical manual published in Taiwan. The photo was taken at launch of the manual in 2016, when we invited Dr. Robinson to Taiwan to provide a presentation. Chung Hsi also published another two books including Stephen Doggett's, "Do You Have Bed Bugs?". This is just a start to Chung Hsi's publication business.



Bayer visited our Taipei office in Nov 2018. Mr. Nadim gave the Certificate of Appreciation to Chung Hsi. Allis is to the immediate right of Nancy.

TELL ME ABOUT YOUR HISTORY IN PEST CONTROL?

After I had been with the company for a few years, Sumitomo Chemical wanted to start a pest control (PCO) business in Taiwan so they came to visit my father. However, in the 1980s, no one knew what a "PCO" was in Taiwan and so we started from scratch. At that time I was in charge of product registrations and was also a sales coordinator in the company. Sumithrin 10SEC was our first PCO product. After completing the registration, Sumitomo appointed a consultant from the Japanese company IKARI to come to Taiwan in order to train me in how to apply Sumithrin 10SEC by ultra-low volume (ULV) spraying. In the 1980s, "ULV" was a new term for the Taiwanese. My first PCO customer to buy Sumithrin was Mr. Lu, the General Manager of DingXiang Co., which was eventually acquired by Rentokil Initial some 20 years later. The reason why Mr. Lu bought this very expensive product (which at that time was 7-8 times more expensive than commonly used agricultural chemicals) is because I was the first and the only female sales person in the industry, and also because of my sincerity and technical knowledge. This is what Mr. Lu told me several years later. After promoting and educating Taiwan PCO customers in "ULV" application, we investigated suitable formulations

for Taiwan PCOs, in order to fit their specific needs.

I am someone who likes to learn processes thoroughly before implementing them. Thus in order to gain more knowledge and to learn about pest control, I started attending the NPCA (National Pest Control Association) annual meetings in the US from 1993. This association is now known as the National Pest Management Association (NPMA) and the annual event is called 'PestWorld'. From this meeting, I gained extensive knowledge and met many great people in the field. Also, I began to learn what is suitable for application in the Taiwanese market and what would be useful for our PCOs. Pestworld is one of the events that I have attended continuously over the last 26 years. This event, has provided many positive memories that has helped me to foster a strong model for our business throughout my career.

At the PestWorld meeting, I was profoundly touched upon first learning of the concept of integrated pest management ("IPM"). Although I am a chemical supplier, I support the concepts of "non-chemical" and "less-chemical" treatments. As a consequence, I launched the first insect growth regulator (IGR), "SumiLarv" (from Sumitomo Chemical) onto the Taiwanese market. Furthermore, Chung Hsi was the first company in



Photo with Prof. Chow-Yang Lee and his newly published termite book at Pest Summit, 2014.

Taiwan who promoted and educated PCOs in the use of the cockroach gel bait, "Goliath Gel" (from Rhône-Poulenc). For termite control, I assisted Aventis to launch "Termidor" in Taiwan. At the time, Taiwan was the third country in the world to launch Termidor. In 2004, when fire ants invaded Taiwan, I assisted our government to import Sumitomo's IGR fire ant bait produced called "Distance", and Bayer's "Topchoice" and "CeaseFire".

From an education stance, in 1996, I hosted the first pest control technology conference for libraries, galleries and museums. This was to improve the quality of the pest management processes for their collections.

WHY DID YOU DECIDE TO JOIN A PEST SUPPLY COMPANY?

My father founded Chung Hsi Chemical in 1950. We are the oldest company in Taiwan that manufacture and sell insecticide products for domestic use.

I studied plant pathology at university and graduate school. After graduation, I worked for three years at the Taiwan National Industrial Technology Research Institute as an associate researcher

to investigate qualitative and quantitative analysis of mycotoxins (from fungi). Around that time, the government set up a quality control (QC) regulation, which required all chemical companies to follow. Thus, my father called me back to help him to set up the QC department for the company.

IN LEADING CHUNG HSI CHEMICAL WHAT WERE THE GREATEST CHALLENGES THAT YOU HAD TO OVERCOME IN ORDER TO BECOME THE LARGEST PEST CONTROL SUPPLIER IN TAIWAN?

I think the greatest challenge was to take the traditional Chung Hsi Chemical company and to transform it into a role of a supplier to the professional PCO market.

In my father's time, Chung Hsi Chemical only focused on the 'over-the-counter' pesticide market. After I joined Chung Hsi, I started the PCO business and introduced new pest control concepts gained from different international conferences and exhibitions overseas. By organizing numerous training courses and seminars in Taiwan for my PCO customers, which I provided for free, I believe this has helped our customers to upgrade and connect to the latest world trends. Apart from providing education, Chung Hsi also introduced into Taiwan many IPM products. We now have long term relationships with many multinational brands including Bayer, Sumitomo, B&G, PestWest, pulsFog, Birchmeier, Termatrac, to name but a few.

IN AN INDUSTRY SO DOMINATED BY MEN, HOW HARD WAS IT FOR YOU TO BE ACCEPTED?

Although I am the only female to run a chemical company in the industry, I view myself as a normal person. I believe that when you are sincere and with a mind that can accept all challenges, it is no different when you are a woman. However, sometimes there can be challenges. From this perspective, I always believe that



Attending PulsFog 50 year anniversary in Überlingen, Aug 2018.

keeping on the right path is very important in running a business, and this is why many of my suppliers and customers have become close personal friends. Also, by using feminine instinct and a delicate observation, I can provide suitable solutions to the customer in order to fit their special needs.

WHAT WERE THE BIGGEST CHANGES IN THE INDUSTRY THAT YOU OBSERVED DURING YOUR TIME WORKING IN THE FIELD OF PEST MANAGEMENT?

The shortage of human power in the industry. The recruitment of qualified staff and retaining good people is becoming more difficult now.

WHAT ARE THE CHALLENGES THAT THE PEST CONTROL INDUSTRY WILL FACE IN THE FUTURE?

In the future, green solutions such as less chemical usage and non-chemical treatments will play a more important role in the industry. It will be increasingly necessary for companies to think about the connection between environmental protection and their company's core value. Companies should not use the strategy of cutting prices to gain customers, but rather jump out from the 'red sea' and find their own niche in the market.

Furthermore, as regulations on chemical use become more stringent, and the customer's expectation becomes more demanding, PCOs need to implement the appropriate management changes into their business, in order to fit all legal and market requirements. The companies

that will survive in the marketplace needs to know how to manage and retain good staff, must save costs by increasing their performance, and manage their chemical application more precisely.

WHAT DO YOU THINK THAT TAIWAN CAN TEACH THE REST OF THE WORLD ABOUT PEST CONTROL?

Due to the tight regulations of the environmental protection agency (EPA), to fulfil the requirements for insecticide use is a great challenge. However, these requirements force the suppliers and the PCOs in Taiwan to upgrade and improve their procedures and processes, in order to be fully qualified and to survive as a business. From my point of view, if you can follow the government's requirements, your company will become more competitive and more likely to succeed in an uncertain future.

NOW THAT YOUR DAUGHTER, ALLIS LU, IS AN ESSENTIAL PART OF YOUR BUSINESS, WHAT ADVICE WOULD YOU GIVE TO ALLIS AND ALL YOUNG WOMEN, TO SUCCEED IN A MALE DOMINATED INDUSTRY?

I will say that learning, being humble, positive thinking and hard working are always the right combination for running a successful business. Another essential aspect is to focus on your current resources to create the maximum value, follow your own principles, and keep on the right path.

Thank you Nancy for a very insightful discussion. ■



Chung Hsi held small group training for architects in Taipei to introduce Termguard system for building protection, May 2018.

The Future of Pest Management?

This is a summary of the keynote presentation from
FAOPMA-Pest Summit 2018

David Gay



At the recent FAOPMA-Pest Summit 2018 conference in China, my presentation focused on the future of pest management. I lightly touched on potential disrupters to traditional business models, notably technology that is currently being employed that connects service providers (i.e. pest management companies) to the customer. I loosely, and without much thought, titled this "The Uber Effect". Over the course of the conference, I had a number of people ask about this emerging trend and were after more information on the topic. This article expands on the above presentation. It aims to answer some of the questions people have about the emergence of "on-demand service".

It has only been several months since the idea was presented. However, I am now frequently coming across examples of how this digital disrupter (i.e. the "Uber Effect") could be, and is being used in our industry. In fact this effect is apparent in many logistically similar service based industries today.

What is even more impressive, is the amount of capital and investment being raised by these start-up businesses and their resulting valuations. Several of the companies are now worth more than USD\$1 billion. Perhaps this is not overly surprising, given how rapidly the "on demand service" sector is growing, with global estimates of USD\$22 billion in 2015 to USD\$35 billion in 2017, and USD\$57 billion by the

end of last year.

The "on demand" economy, also now referred to as the "access economy" and "Online to Offline" (O2O), is changing the face of industries. The way Netflix destroyed the DVD rental market, and Napster and iTunes wiped out retail music stores, the "Uberisation" of service industries will impact pest management too. Not unlike 'Aggregator' or directory sites like 'One-Flare', 'Hipages', 'ServiceSeeking', and 'Airtasker', these new and emerging platforms will provide greater value for the service provider and greater convenience for the consumer.

In the future customers will find pest managers via digital platforms, much like we use Uber...

In the USA, Amazon has thrown its hat in the ring with 'Amazon Home Services' that currently includes pest control services. Digital platforms like 'Thumbtack.com' currently lists more than 1,100 types of services on offer. JungleWorks.com and HouseCallPro.com are just two of the many start-ups that are offering a full suite of back end tools and technology for pest management businesses. This will allow them to build an "on-demand home services" business on one of the

many available platforms.

In China, 'Ayibang' has joined forces with 'Guanjiabang' to provide home services and home help to over 300 million Chinese homes, on both a scheduled, and an on-demand service, via a digital platform. 'WeChat' is also a contender in the ultra-competitive and emerging Chinese market to develop an on-demand home services following.

In many parts of the world, the traditional workplace is changing, especially in economies that are moving from manufacturing to services. Technology is enabling people to work productivity and creativity from, and across, all corners of the globe. Companies can source globally for cost effective skills, such as software development in India or Vietnam, and call centre and help desk operators from the Philippines. Skilled service providers and subject experts can also offer their services to almost any employer globally via the myriad of collaboration platforms that are currently available. Some of the big platform names include:

- Airtasker.com
- Export 360.com
- Upwork.com.com
- Thumbtack.com
- Iworkyou.com
- Plus, specialty peer to peer on demand workforce platforms

These new and evolving platforms are gaining popularity. They are servicing an ever increasing industry and consumer base. Moreover, they will continue to grow as they are meeting a need, or a niche, that current traditional employment arrangements don't meet, and current business models can't compete with. They offer:

- Convenience
- Usually low cost for the consumer
- Flexibility for the vendor
- Are outside most government regulations or tax systems

Currently most of these platforms are suited to professional service providers, such as computer based tasks. However, a number of platforms are emerging that are labour and specialist trade-based services, such as 'Airtasker', 'Thumbtack', and 'Weploy'. These platforms are rapidly gaining momentum and users due to their low cost and ease of use. For many

smaller or independent operators, they solve a major problem, in that they can replace complex and expensive digital marketing (e.g. Google and social media, and automated marketing like 'HubSpot') and be their sole source of work/leads.

An analogy to the potential future of service based industries is the history of the taxi.

Initially only the very wealthy had cars. Then taxis arrived that gave the convenience of a car at a fraction of the cost. Uptake was rapid and the industry was born. Then the taxi market evolved to have low cost taxis at one end and chauffeured limousines at the other end. Whilst taxis remained relatively cheap, their "service" declined to the bare minimum. At the other end, limousines and chauffeured cars provided exceptional and reliable service, but at the high cost that few could afford. However, everyone aspired to be driven in a limousine!

Then out of nowhere came Uber. They virtually offered a limousine service. They made the passenger feel safe in a clean vehicle and at a cost less than a taxi. They did this with a platform that both leveraged technology, but importantly tapped into a new workforce that wanted to work on their own terms, when they wanted, and thus in a highly flexible manner. Uber offered them the job security of a big corporation with the flexibility of a small business owner, without the risk of starting a business. Uber has been so successful, that the limousine industry came to them and asked, "How can we be a part of this?" The result was 'Uber Black'.

Is it so hard to imagine a similar scenario in the pest management industry in the future?

Thus our workforce would log on and off like an Uber driver, and be ready to deliver the service. Our customers order services via an app, when and where they need it. All the payments and documentation then occur seamlessly in the background.

I leave you with that thought. ■

David Gay OAM is the co-owner of W.R. Gay Pest Control in Melbourne, Australia, and Past President of FAOPMA and the Australian Environmental Pest Managers Association.

Email: davidg@pest-control.com.au

Current Challenges in Urban Pest Management and Vector Control in Asia



This is a summary of the keynote presentation from
FAOPMA-Pest Summit 2017, in Chang Mai, Thailand

Chow-Yang Lee

Human activities affect the urban landscape through land cover, land use conversion, modification of biophysical and ecological processes, and via alteration of species habitat and assemblages. These changes destroy the clear boundaries between urban and natural ecosystems. Urban sprawl increases the risk that pests and the disease agents they carry will infest the urban environment (Morzillo & Schwartz 2011). Globalization and advances in modern transportation systems also have promoted the spread of invasive pest species (Meyerson & Mooney 2007; Hulme 2009). The global pest management market is presently estimated at US\$16 billion and is expected to reach US\$21 billion by 2021 (Technavio 2018), with a compound annual growth rate (CAGR) of 5.67%. At present, North America has the lion market share (50%) of the global pest management market, with a CAGR of 5%, but the highest market growth rate is in Asia (~US\$4 billion), which has a CAGR of 8.5%.

FACTORS DRIVING THE GROWTH OF THE PEST MANAGEMENT INDUSTRY IN ASIA

Several factors are driving the rapid growth of the pest management industry in Asia:

(1) *Urban population growth:* Asia is the center of the global urban population increase. At present, Asia is

home to 17 megacities (a population of more than 10 million), but five more are expected to emerge, making the Asia-Pacific home to 22 megacities by 2030 (UNESCAP 2017). The drastic increase in urban population has led to the demand for pest management services.

“New building construction concepts...include beautifully planned landscaped gardens... have proved to be habitats in which pests can thrive”

(2) *Improved socio-economic status and rising awareness:* By 2030, Asia will have 66% of the global middle-class population (some 3 billion people), and will account for 59% of the middle-class consumption (Pezzini 2012). These consumers will change from being the beneficiary of ineffective government-based pest control services to the buyers of pest management services. The rising awareness of the importance of pest management due to better education and the power of social media are contributing factors to this

change.

(3) *Regulatory and legislative requirements for hygiene services and food safety:* Many countries in Asia are introducing regulatory and legal requirements for hygiene services and food safety. Many of these requirements mandate directly or indirectly the need for pest management services. For example, the Food Safety Law of the People's Republic of China (2015) states in Article 34 (item VI) that no food or food additives that are rotten or spoiled, contain mould or insects, or are dirty or contaminated and contain foreign matter, shall be produced or distributed. Due to these requirements, food factories are adopting international standards, especially those of food standard organizations (e.g. AIB International, HACCP, BRC Global Standards), to ensure that the best practices are being incorporated. Pest management is vital element of these standards.

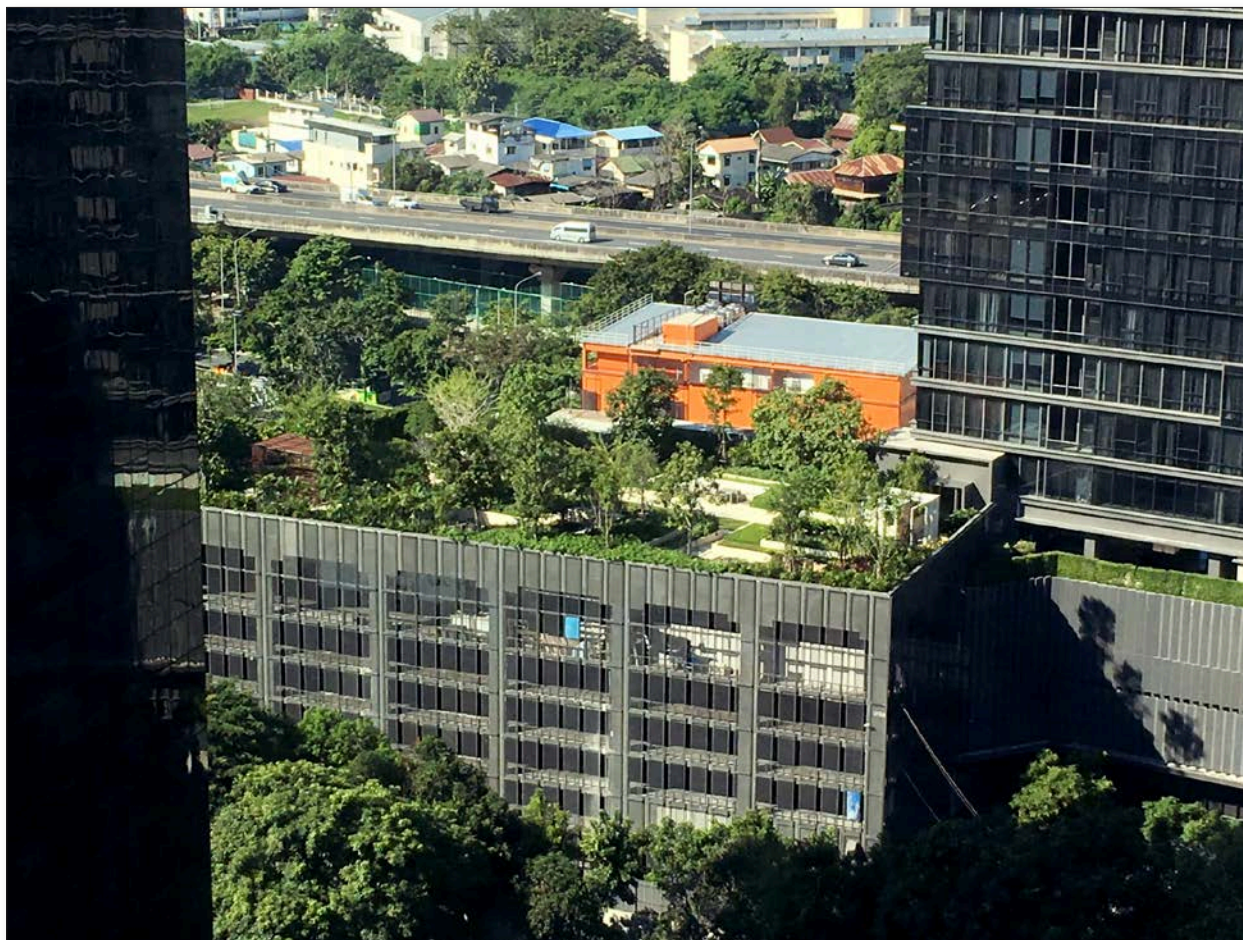
(4) *Increase in global travel for tourism and business:* With the wide availability of budget airlines in Asia, air travel is becoming more diverse geographically. Countries such as China, Thailand, Japan, Korea, and Southeast Asian countries, are popular destinations for tourists from around the world (Statista

2018). Due to the increase in the number of tourists and business travellers, the number of hotels in Asia has risen, which has led to increasing demand for pest management services. The number of new restaurants in Asia is also on the rise (Tomiyaama 2015). Due to food safety legislation, pest management services in the food and beverage industry is mandatory in many countries.

CHALLENGES

The pest management industry in Asia today faces four main challenges in the areas of business, technical aspects, pests, and human resources.

(1) *Business:* Increasing numbers of local and regional pest management companies are being acquired by large multinational companies such as Rentokil, Anticimex, and Rollins. Generally, acquisition benefits these large companies by providing faster business growth (because organic growth is slow), acquiring new talent, and providing a quick method for venturing into a specific niche market. After acquisition, these companies need to



Roof top gardens are providing habitat for pests where non previously existed.



The merging of FAOPMA with Pest Summit at Singapore in 2016 created a stronger voice for the pest management industry throughout the Asia-Pacific Region.

demonstrate to their shareholders that the company can also grow organically. This leads to the need for more sales, but if investment in training personnel and personnel numbers are compromised, the quality of the service will drop.

After acquisition, the new management may have different views about the importance of previously highly prized departments, such as technical and quality control sections. Because of the need to demonstrate an increase in profit, excellent staff from these departments are often transferred to sales, marketing, or operations because they are viewed as having a more direct impact on the revenue of the company. However, these employees could become disillusioned and leave the company.

On the other hand, smaller and local-based companies find it hard to compete with these larger multinational companies, especially in terms of price and brand name. Thus, many of these companies have recorded a decline in sales and have lost lucrative accounts.

It is not uncommon for some countries, such as Singapore, to experience high business operating costs. The cost to own a truck or van for a pest management operation can amount to USD\$100,000

because a certificate of eligibility must be purchased before one is allowed to own the vehicle.

(2). *Technical Aspects:* Pest management technicians in Asia often have limited training. Although large companies may provide elaborate training and programs tailored to new personnel, smaller companies typically only provide their technicians with on-the-job training. An experienced and knowledgeable senior employee will show a newer employee the tricks of the trade. However, a mentor with bad attitudes and habits will pass those traits on as well. Moreover, with more than three dozen languages being spoken in Asia, it is difficult to harmonize training sessions in Asia.

Another challenge lies with the licensing program for pest management technicians. Only a few Asian countries (Singapore, Malaysia, Thailand, Philippines, and Taiwan) mandate that pest management technicians must be licensed, whereas other countries make it optional (Table 1). In Japan, a license is only required when treating buildings larger than 3,000m². To obtain the license, a technician only needs to attend a five day training course. At present, no pest control license is required to work in India or Indonesia.

Integrated pest management (IPM) is a reliable approach that is practiced by pest management professionals in the more progressive companies in Asia. In spite of the benefits of IPM, surveys have shown that it has yet to become a widespread practice among pest managers in Asia. Several factors may account for this reluctance to apply IPM. Marketing pest management services is similar to marketing any other service. However, unlike a product that can be held and tried out, skills and services cannot be appreciated until the actual service is provided. Because of this uncertainty (and as getting rid of pests may not be the main priority of some clients), customers are often reluctant to commit and will bargain for a lower price or seek other quotes at lower rates (Dhang 2014). A more expensive IPM-based programme is less competitive than conventional treatments, which leads to poor client acceptance. Therefore, many pest management companies, especially in SE Asia, are reluctant to offer a true IPM program

New building construction concepts that include beautifully planned landscaped gardens and planting features in and on buildings (e.g., green walls and high-rise sky/roof gardens) have proved to be suitable habitats in which pest populations can thrive. These concepts provide a complete ecosystem for pests to flourish, as they offer ideal light, water, air, and nutrient conditions. One outcome of this design trend has been an increase in termite infestations via populations established above ground (Koh 2014).

Additionally, many new housing development projects are embracing the eco-living concept, which involves building houses near forest reserve areas. Architects, developers, and engineers prefer to integrate building projects within natural ecosystems without considering potential problems with pests and pest reservoirs. By eliminating the clear borders between urban and natural environments, the urban setting becomes more susceptible to pests and the diseases they carry (Robinson 1996).

(3) *Pests*: Over the last five years several alien pest species have been introduced in Asia. In 2017, the red imported fire ant (*Solenopsis invicta*) was introduced to Japan in May (Murakami 2018) and to Korea in September (IPPC 2017). An unprecedented outbreak of Zika virus occurred in Singapore in 2016 (Singapore Zika Study Group 2017), and a dengue outbreak took place in Tokyo, Japan in 2014 (Quam *et al.* 2016). Dengue is becoming increasingly widespread in different regions of Asia, and other parts of the world. Outbreaks of other mosquito-borne illnesses such as yellow fever, Zika, and chikungunya also are rising around the world. Climate change has created conditions favourable for mosquito spread, as has human travel and migration. The acceleration of urbanization has created new mini-habitats for mosquitoes, especially major vectors such as *Aedes aegypti* (Kraemer *et al.* 2019).

The recent discovery in Cambodia, Laos, and

Thailand of a *Plasmodium* species that is super resistant to malaria drugs such as artemisinin has highlighted the importance of the need for effective vector control programs (Imwong *et al.* 2017). Because of drug resistance and hence a cure is no longer an option for malaria, efforts must be made to ensure effective prevention from the mosquitoes (i.e., prevention = vector management is the only option now).

Insecticide resistance in urban insect pests and vector mosquitoes is seriously affecting pest management efforts in Asia. Resistance of *Ae. aegypti* mosquitoes against pyrethroids (e.g. deltamethrin) is widespread in tropical Asia (Amelia-Yap *et al.* 2018) and around the world (Moyes *et al.* 2017), along with resistance against the organophosphates (Haziqah-Rashid *et al.* 2019). Across the three continents, ten known voltage-gated sodium channel mutations in *Ae. aegypti* have been detected, which are responsible for insecticide resistance (Moyes *et al.* 2017). Plus metabolic resistance has also been well documented in these mosquitoes. Insecticide resistance is also prevalent in the German cockroach (*Blattella germanica*) (Chai & Lee 2010; Ang *et al.* 2013) and bed bugs (*Cimex lectularius* and *Cimex hemipterus*) in Asia (Dang *et al.* 2017).

Product performance is another issue affecting the pest management industry in Asia. It was often assumed that whatever works against one pest group in North America or Europe should also work against pests from the same group in Asia. However, this has proved not to be true for some pests in Asia. For example, termite bait containing chitin synthesis inhibitors that were developed in the US performed poorly against the fungus-growing termites in Southeast Asia (Lee 2002; Lee *et al.* 2007). Additionally, pit-fall monitors that were designed and used widely to combat infestations of the common bed bug (*C. lectularius*) in the US performed poorly against the tropical bed bug (*C. hemipterus*) in Asia (Kim *et al.* 2017).

(4) *Human resources*: Today, the workforce in the pest management industry consists predominantly of members of the millennial generation. Many employers have reported numerous challenges in working with this generation of staff. Members of this age group have never experienced war or deprivation and depression or uncertainty, and they believe they are destined for success. Many younger employees are narcissists, do not want the boss's opinion but want him/her to confirm theirs, and have almost no or minimal loyalty to the company. Many of these employees are glued to their mobile phones and are big users of social media. Millennials often regard pest control as a lowly disrespected profession and prefer to work in pharmaceutical sales. ManpowerGroup (2017) surveyed 19,000 millennials across 25 countries and found that the most important factors when choosing a job are as follow: money (92%), security (87%), holidays/time off (86%), great people (80%), and flexible working hours (79%).

Many pest management companies in Southeast

Table 1. Requirement of pest management operator license for various Asian countries

Country	Operator License Requirement	Recertification Requirement	Additional Information
China	Available, but not mandatory	Not required	Three levels of certification: beginner, intermediate and advanced
India	Not required	Not required	Other licenses are required to operate a pest management business
Malaysia	Mandatory	Not required	Pass an exam administered by Pesticide Control Division of Malaysia
Singapore	Mandatory	Every 3 years	Three-month training, administered by the Institute of Technical Education (ITE) and National Environment Agency (NEA)
Thailand	Mandatory	Every 5 years	Five-day training course, pass an exam, administered by Thai Food & Drug Administration (FDA)
Indonesia	Not required	Not required	Nil
Taiwan	Mandatory	Every 3 years	Administered by Taiwan Environmental Protection Agency (EPA), undergo Continuous training for recertification
Japan	Only for those treating buildings more than 3,000 m ²	Every 6 years	Five-day training course, pass an exam. Pest management in food plants, shops, restaurants, homes, etc does not require any license to operate
South Korea	Not required	Not required	Attend a 16-hour course organized by Korea Pest Control Association (KPCA)
Philippines	Mandatory	Not required	Two-day course, administered by Food & Drug Administration (FDA)

Asia are also losing their technicians to other jobs that offer greater freedom than that required by a company. For example, some technicians have left the pest management field to become drivers for companies such as GrabCar and Gojek, which offer ride hailing, ride sharing, and food delivery services similar to those of Uber in other regions.

Moving forward

In every crisis, there is an opportunity. Based on this adage, all of the challenges that the pest management industry is facing today could be turned into business opportunities.

Blue Ocean Strategy

This is a marketing theory about creating and capturing uncontested market space, thereby making the competition irrelevant (Kim & Mauborgne

2005). Many company owners realize that they are using conventional business strategies and are stuck in a red ocean. Despite this realization, many are unsure of how to start the process of moving to blue waters, as it requires convincing team members to accept a concept that goes against the long-established rules of the industry. Recently, the authors of *Blue Ocean Strategy* published a new book titled *Blue Ocean Shift* that provides a systematic 5-step approach that can be followed to create and capture blue oceans at minimal risk (Mauborgne & Kim 2017).

Small pest control companies should work together to help each other with sales and jobs. Additionally, they could establish a win-win partnership with foreign companies. For example, Japanese pest management companies that secure contracts with Japanese-owned factories in other Asian countries could contract with the local pest control companies to carry out pest

control services.

Managing millennials

By 2025, millennials will make up 75% of the world's workforce. It is essential to understand the mindset of millennials and learn how to work with them (ManpowerGroup 2017). Millennials prefer top management to:

- Be their mentors, not bosses;
- Provide the opportunity for learning and development;
- Offer a balance between personal and professional life;
- Provide an opportunity for more travel;
- Create a strong company culture;
- Give constant recognition (they want to "level up", just like when playing video games).

Engaging all stakeholders – strategic partnerships

Pest management professionals must embrace the right concepts of IPM. They must sell the services of protecting humans and property rather than spraying pesticides. The inspection process must be the critical activity, followed by source reduction and habitat modification. Pesticides, especially those that can be precisely placed, are to be used only as and when required. These professionals must learn and equip themselves with the latest technology and strategies (e.g. attending pest management conventions).

Health authorities must be proactive rather than reactive. Adequate funds to conduct proper vector surveillance programs must be made available. Practicing fire fighting (e.g. thermal fogging and ULV) during a disease outbreak is a knee-jerk response. Instead, surveillance, inspection, source reduction, and habitat modifications must be carried out regularly. New management technology must be explored (e.g. the use of *Wolbachia* in managing *Aedes* mosquitoes in Vietnam, Singapore and Malaysia). Additionally, health

authorities should make good use of social media for public education and citizen involvement.

University researchers should develop and evaluate new strategies and compounds to combat urban insect pests, and they should conduct research to better understand the biology and ecology of the pests. Universities should train and nurture the next generation of urban pest managers and intensify research focused on urban pest management. Researchers must communicate research findings to practitioners in layman's language at conventions and seminars and via other forms of mainstream and social media.

Chemical manufacturers and insecticide suppliers must explore novel delivery systems that emphasize precision placement. Pesticides, when used, should be 'contained' to minimize run-off (e.g. virtual bait stations). They should be selling products based on technology and novelty rather than on how much pesticide they contain. A product stewardship program is crucial, and regular training seminars for customers should be offered to upgrade consumers' knowledge and skills.

Architects and building developers must cooperate and work with pest managers to develop eco-friendly pest-proof building designs. Additionally, Building managers should cooperate with pest managers at each inspection. Urban sprawl is inevitable, but proper measures can be taken during development stages to minimize human-pest contact.

Pest management associations in Asia should work together to establish a strong alliance. The merging of FAOPMA and Pest Summit association countries in 2016 was a major step towards a stronger industry voice in the Asia-Pacific region. They must consolidate to create a unified online training program that is relevant to the region (in multiple languages). A database referral center should be established to provide information about pests and pest management.



The Chinese believe that in every crisis, there lies an opportunity .

SUMMARY AND CONCLUSION

The pest management industry in Asia will experience a good growth rate for the next 20 years. Despite this growth, the industry will face challenges in the realms of business, technical aspects, pests, and human resources. The ability to turn challenges into opportunities will be the key to running a successful pest management company. The involvement of all stakeholders is critical; pest management associations, manufacturers, academics, and building owners need to establish an "everyone is a winner" strategic partnership. ■

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What We See, What the Mosquito Sees

Uncovering the hidden world of insects

Images and text by Stephen L. Doggett



Giant glowing orbs, fluorescent bands with radiating patches, bodies that appear to be burning so bright that they appear ready to burst in an explosion of flames, and ghostly luminous parasites. Sounds like the stuff of science fiction...or even nightmares? Well no, in fact this is all perfectly normal...if you are a mosquito!

Insects like mosquitoes do not see the same light wavelength as we do. What we call 'visible' falls in the wavelength range of 380—740nm. While insects can see some light in the visible wavelength range, they can also see ultraviolet (UV), which has a much shorter wavelength that covers 10-400nm.

As a consequence, the world looks different to a mosquito, in fact, very different. Eyes that appear black as pitch to us radiate brightly under UV like glowing spheres. Membranes on the body shine as hot as the sun. Colours that are normally invisible suddenly appear, while parasitic mites fluoresce bright pink and orange.

If you are interested in how a mosquito appears to another mosquito, then turn the page!

Wondering how these shots were taken? An explanation of the equipment used follows.

Firstly, a very solid tripod is required. I have a Manfrotto carbon fibre unit with a central geared column (model MT0573C-G). A geared tripod head is necessary for the fine focusing adjustments required and a Manfrotto 405 is perfect for this job. Plus being Italian made, means that it looks great (and probably makes you a better lover!). A focusing rail is also necessary to facilitate the tiny

adjustments required and I do recommend the superb German constructed Novoflex Castel-G. All the images are 'stacked', which means that shots are taken at different focal points and then combined in software to provide a greater depth of field. In order to be consistent in taking the shots at different focal points, an automated device like the Cognysis Stackshot is to be recommended. Next comes the camera and Canon has to be recommended due to their excellent macro lens range. I use a Canon 7DII coupled with the amazing MPE-65 lens, which can magnify up to 5x (Laowa have a 2.5-5X ultra macro lens, but this is not as flexible as the Canon version which can magnify over 1-5X). Naturally a flash is required for the visible light shots and the Canon MT24ex couples perfectly with this system. For the UV images, a powerful UV torch such as the Jaxman U1C works well (you can buy UV flashes at around \$USD1,000 each from maxmax.com, but you may need two). A neutral background that does not fluoresce will be required as the back drop. I use a blue cardboard folder. Plus you will need a meaty computer to process the stacked images, along with programs such as Lightroom, Photoshop, and Zerene Stacker, to process and stack the shots. Plus there are all the accessories such as clamps, bags, batteries, chargers, backdrops, pinning equipment, etc. Don't expect much change from \$USD20,000! ■

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Top Left: *Toxorhynchites speciosus*, natural light left, UV right.

Middle Left: *Coquilleltidia xanthogaster*, natural light left, UV right.

Bottom Left: *Culex annulirostris* under UV with mites.

Top Right: *Sabethes cyaneus*, natural light left and UV right.

Middle Right: *Anopheles annulipes*, natural light left and UV right. Note the mites.

Bottom Right: *Coquilleltidia xanthogaster* viewed under UV front on.





Stephen L. Doggett

Fruit Flies as Potential Vectors of Food-Borne Illnesses

New research showing the dangers of these flies

David Lilly & John Barcay

Fruit flies (*Drosophila* spp.), also known as ‘Vinegar flies’, have long been a source of annoyance for restaurants and bars. But new research shows that these tiny pests can potentially play a greater role in spreading illness-inducing bacterial pathogens to food and food preparation surfaces.

The study, conducted by Ecolab scientists, was recently published in the *Journal of Food Protection* (Black *et al.*, 2018) and presented at the 2019 FAOPMA-Pest Summit in Shenzhen, China, by Dr. David Lilly. The study found evidence of fruit flies’ ability to transfer harmful bacteria from a contaminated source to surfaces or ready-to-eat food. Fruit flies are present in more than half of foodservice facilities, according to data collected by Ecolab’s field team, which provides both comprehensive and localized treatment options for small flies.

In laboratory experiments, the researchers used specially made fly enclosures to assess fruit flies’ ability to transfer *Escherichia coli*, *Salmonella* and *Listeria* bacteria from a contaminated food source to surfaces of the enclosures. They also examined fruit flies’ ability to transfer *E. coli* from a contaminated food source to non-contaminated foods. Finally, the researchers investigated fruit flies’ capacity to carry bacteria – and the location on their bodies where they are most likely to carry the microorganisms.

Results showed that fruit flies are capable of transferring *E. coli*, *Salmonella* and *Listeria* to surfaces and relocating *E. coli* from a contaminated source to fresh, ready-to-eat food. The data showed that, on average, a fruit fly had the capacity to carry 1,000 (range 150 – 10,000) ‘foreign’ bacteria – microorganisms that are not part of their natural flora. Soil, biofilm and bacteria

were found on fruit fly tarsal and leg areas.

In presenting the research, Dr. Lilly explained that “The presence of even a small number of pathogenic food-borne bacteria transferred by fruit flies to food preparation surfaces or ready-to-eat foods can lead to a high probability of infection. This research confirms that the risk of fruit flies to food safety is as threatening as that of other pests, such as cockroaches, rodents and house flies.”

Study co-investigators Elaine Black, Jerry Hinrichs, Douglas Gardner and John Barcay conclude that food operators can reduce the risk by being prudent in eliminating fruit flies through proper cleaning and sanitizing of potential breeding sites. Those sites – generally anywhere food debris and aqueous fluids can collect and stagnate – include floor drains, drain lines from drink dispensing equipment, and poorly maintained floors. ■

Reference: Black, E. P., Hinrichs, G. J., Barcay, S. J., & Gardner, D. B. (2018). Fruit flies as potential vectors of foodborne illness. *Journal of Food Protection*, 81(3), 509-514).

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Dr Stephen Doggett
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Dr Wan Fatma Zuharah
Universiti Sains Malaysia (USM)
Malaysia

Active Insight: The Pyrethroids

In this series, the chemistry of major insecticide groups will be examined

Steve Broadbent



The development of the currently used residual pyrethroids is a classical study in insecticide development chemistry.

Pyrethroids are synthetic (man-made) compounds, though the design of the molecules was derived from the chemistry of natural pyrethrins.

Pyrethrins are natural insecticides, extracted from

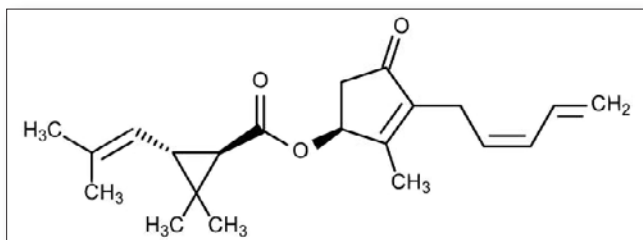


Figure 1. Pyrethrin I

certain species of *Chrysanthemum* daisies, most usually *Chrysanthemum cinerariaefolium*. The insecticidal components are contained within the seed cases of the plant and are extracted shortly after flower bloom. Pyrethrins consist of six insecticidally active components. Named after their structural and isomeric layout, these are pyrethrin-I (Figure 1) and pyrethrin-II; cinerin I (Figure 2) and cinerin II; and jasmolin I and jasmolin II.

LaForge and Haller in 1936 were the first to

determine the structure of these pyrethrins, which they showed were esters of chrysanthemic acid. It was this knowledge of the structural chemistry of pyrethrins which lead to the development of synthetic equivalents, the pyrethroids.

Pyrethrins are contact poisons which penetrate the insect nervous system. There they bind to sodium channels that are found along the length of the nerve cells. These sodium channels are responsible for nerve signal transmission. When the pyrethrins bind to sodium channels the normal action of the channels is blocked which leads to hyperexcitation, loss of function, and eventually causes the shutdown of the nervous system leading to death.

A concern with the pyrethrins was that often

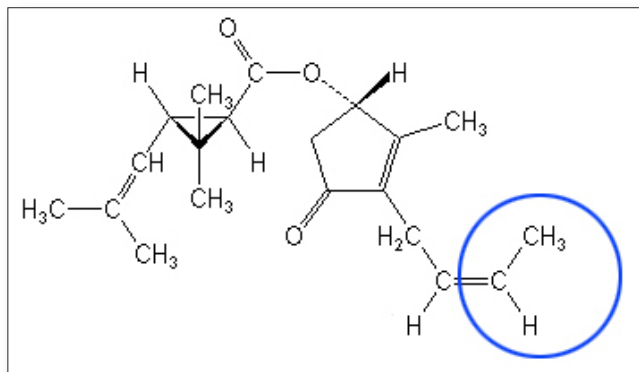


Figure 2. Cinerin I

the insect was 'knocked down', but it would later recover. This was because the pyrethrins are quickly detoxified by enzymes in the insect. It is for this reason that synergists such as piperonyl butoxide are usually added, to delay the enzyme action. The other issue is that they rapidly breakdown on exposure to sunlight, so pyrethrins provide no residual activity.

The drive to create synthetic variations was driven by the desire to improve upon this natural chemistry. The pyrethrins consist of an alcohol moiety (part) and a carboxylic acid moiety, joined together by an 'ester bond'. The pyrethroids were derived following this same structural route, making changes to the alcohol or acid moieties, and later the ester linkages, in order to improve the efficacy and residual performance of the molecules.

The first pyrethroid developed was allethrin (Figure 3), in 1949, by three scientists working for the United States Department of Agriculture (USDA). At the time, this was hailed as a major milestone in the field of chemical research, comparable to the development of synthetic rubber. The stability of allethrin made it superior to the natural pyrethrins in both kill and knock-down effects against mosquitoes.

The allethrin molecule is closely similar to that of cinerin I. Apart from stereochemical considerations, which will be discussed later, the only difference is that in allethrin, the 2-butenyl group, in the alcohol moiety, was replaced by an allyl carbon side chain. This is seen clearly in the diagrams below.

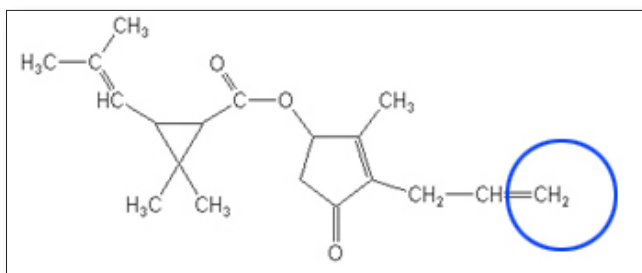


Figure 3. Allethrin

Allethrin's successful discovery was followed by the development of further pyrethroids through the 1960's; e.g. tetramethrin, resmethrin, and phenothrin. Known as Type I pyrethroids, these were more insecticidally active than pyrethrins, whilst retaining their low toxicity to mammals. They were also unstable in sunlight, so they still provided no residual protection. They remain to this day commonly used

in flying insect killer aerosols and mosquito coils.

Whilst the low mammalian toxicity of pyrethrins and Type I pyrethroids is good for the environment, they provide poor efficacy when applied in situations where residual performance is important. This changed in 1974, when a team of scientists at Rothamsted Experimental Station in the UK, (now Rothamsted Research), developed the first Type II residual pyrethroids. Located at Harpenden in England, Rothamsted is one of the oldest agricultural research institutions in the world, having been founded in 1843 by John Bennet Lawes, on his inherited sixteenth century estate, Rothamsted Manor.

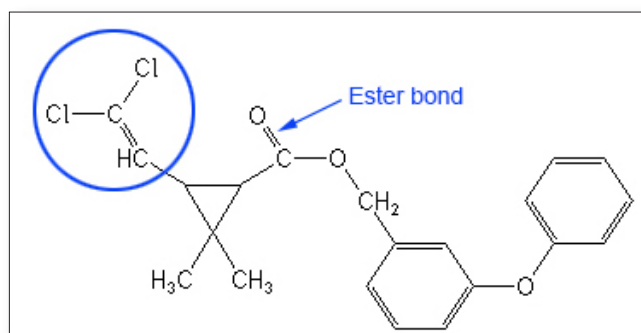


Figure 4. Permethrin

The first of these Type II residual pyrethroids was permethrin, which still possessed the basic cyclopropane carboxylic ester structure of the earlier Type I pyrethroids. The important point to note with the permethrin molecule though is the presence of the chlorine atoms at the end of the acid moiety, as highlighted in Figure 4. A Co-efficient of Insecticidal Activity (CoIA) Chart used to compare the potency of different pyrethroids rates permethrin as 10.

Cypermethrin was developed rapidly after permethrin. Cypermethrin, as the name suggests, is closely similar to permethrin, except it introduces a cyano-group on the alcohol moiety (Figure 5). This provided improved residual performance and insecticidal activity, with cypermethrin rated to have a CoIA of 25; 2.5 times greater than permethrin.

Within two weeks of developing the very first light stable pyrethroid, permethrin, the Rothamsted team developed the most potent pyrethroid, deltamethrin. This development 'simply' involved a substitution of the chlorine atoms at the end of the acid moiety in cypermethrin, with bromine atoms (Figure 6).

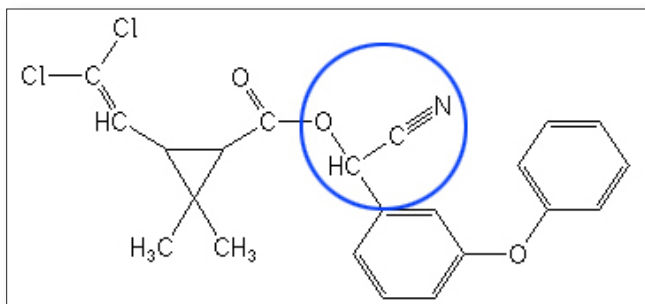


Figure 5. Cypermethrin

This substitution produced further improvements in residual performance and insecticidal activity, with deltamethrin having a CoIA of 100. The development of the Type II pyrethroids was rapid and their success in the market lead over the next decade or so to a range of further compounds, as various agri-businesses found it essential to have their own residual pyrethroids. Changes to the acid moiety lead to the development of fenvalerate, fluvalinate, tralomethrin, cyhalothrin, cyfluthrin, and bifenthrin.

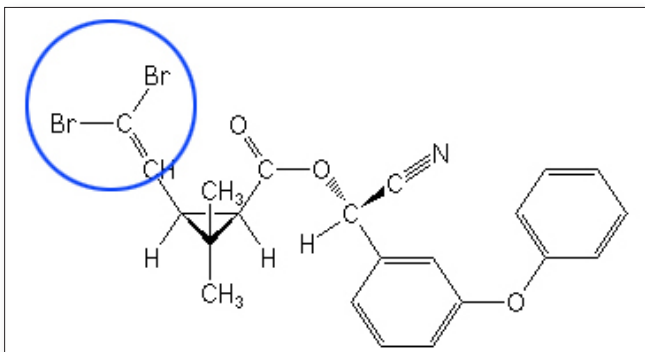


Figure 6. Deltamethrin

The presence of the cyano-group brought a degree of irritancy with it for people, and repellence for insects. In people this is generally observed as a transient paraesthesia (tingling with numbness and burning). In insects this causes them to flee the area, which can lead to a spreading of the pest problem, particularly in public health situations.

Bifenthrin is an interesting pyrethroid since it uses fluorine atoms and, like permethrin, does not have a cyano-group (Figure 7). It displays high residual performance and insecticidal activity, with a CoIA of 33. Since it does not possess the cyano-group, it displays significantly lower levels of repellence, and offers interesting adaptations in the market, particularly for the residual control of mosquitoes. It also has good residual performance in the soil,

making it an excellent soil termiticide.

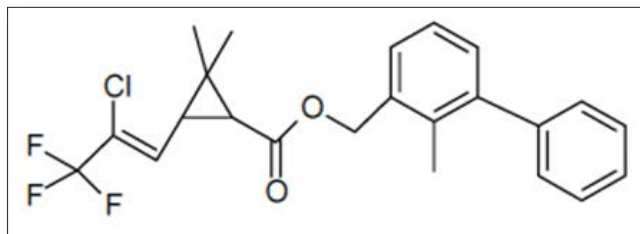


Figure 7. Bifenthrin

With the exception of deltamethrin, pyrethroids are a complex mixture of isomers. This means that they contain several molecules, all with the same chemical formula (the atoms are joined together in the same sequence), but they have a different spatial arrangement of the atoms. Technically such compounds are called stereoisomers. These stereoisomers often have different physical properties to each other, and in particular their insecticidal properties and mammalian toxicities are different. Some pyrethroids are composed of as many as eight different stereoisomers (shapes).

Permethrin was initially developed as either a 25:75 or 40:60 blend of cis:trans isomers. Originally, permethrin 25:75 was focused on public health markets, since the trans-isomer is less toxic to mammals. Thus, this was a less toxic isomer ratio. It displays slightly lower insecticidal activity, since the cis-isomer is slightly more insecticidally active.

Recent developments have seen companies exploiting the more potent stereoisomers of different pyrethroids. This produced new active constituents such as alpha-cypermethrin, followed by further purification to produce zeta-cypermethrin, with a CoIA of 40. Currently the culminant pyrethroid is the pure single isomer developed from cyhalothrin, gamma-cyhalothrin, which has a CoIA of about 140. Whilst this is a very high-performance insecticide, it is also highly irritant. ■

This article first appeared in *Professional Pest Manager*.

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It Always Pays to Check!

The Editors recount their experiences in finding bed bugs in hotel rooms

David Lilly and Stephen L. Doggett



David's experience: for many years now we have been educating people about the importance of checking hotel rooms for bed bugs prior to settling in for the night. However, whether by good luck or good planning, I had *never* found bed bugs in any of the hundreds of hotel rooms that I had stayed in over the last 15 years of both local and international travel. In fact, I've been so lucky (or unlucky given my research on bed bugs and that I would have appreciated some additional field specimens!), I recently boasted to colleagues that I'd not once found them in my room.

Well, that was until I arrived in Christchurch, New Zealand.

After a long day of travel and meetings, it was tempting to skip the usual inspection and jump straight into bed, but routine is a difficult habit to break, and so down I went for the usual check of the headboard, mattress, ensemble base, and valance, assuming my past experience would repeat yet again. Except, to my surprise, a small but healthy-looking infestation of *Cimex lectularius* was lying in wait (Figure 1)!

A quick call to the front desk ensured a swift and apologetic upgrade to a new room, and a reminder that... it always pays to check!



Figure 1: bed bugs in David's hotel while in New Zealand.

Stephen's experience: similar to David, I had not found evidence for bed bugs in any room that I had stayed in...up until recently. Now I have had two encounters over the last three years, both from Australia.



Figure 2: note the join in the bed head behind the beds.

In the first case, my partner Marilyn (Mel) and I, were on holidays in central Australia to the red centre. We were visiting the famous Uluru (better known as 'Ayres Rock' by many) and the majestic Kings Canyon. The latter being a geological marvel naturally carved into an otherwise desolate and flat landscape. Upon entering the hotel, we placed our bags in the middle of the room (bed bugs are less likely there). Mel noticed some suspicious black spotting in a crack on the bed head behind the beds (I should say that Mel works with me and has been to many bed bug infestations; she also wrote the Fact Sheet for this edition's '*Name This Pest!*', which appears later in the magazine).

Upon further inspection, the bed head was comprised of chipboard and the crack was the join between two chipboard sheets. This join was almost black with bed bug faeces. Furthermore, the join contained vast numbers of eggs (Figure 3), cast skins, and dead bed bugs. Cast skins and dead bed bugs were also in a spider web under the bed.

What we did not find however, were any live bed bugs. The problem I have is that I react badly to

bed bugs, in fact really badly. Even if I receive a single bite from a first instar nymph, I stay awake all night scratching. There was no way I was going to stay in a room that had evidence of bed bugs, unless I had undertaken a thorough inspection and declared the room free of the insect. However, to do this it would have been necessary to dismantle the room. Bed heads would had to have been lifted off the brackets, covers on the ensemble base ripped off, carpet edges lifted, and furniture dismantled. As I did not have permission for a detailed inspection, which normally results in some minor damage, I could have received a rather large bill for room repairs. Thus the best course of action was to take a series of photographs and head over to reception with the evidence and request a room change. Not only did I get a new room (free of any bed bug evidence), it was a spa suite...in the middle of a desert (which is sort of obscene).



Figure 3: eggs and spotting in the join.



Figure 4: spotting from bed bugs? Yup!

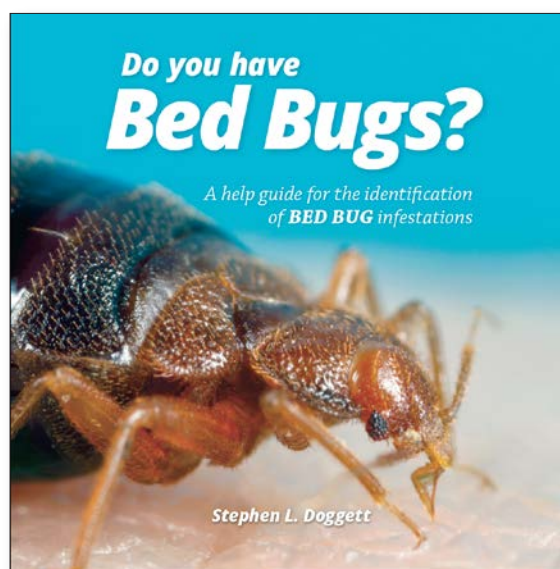
The second time when I found evidence for bed bugs in a hotel was when I was in Cairns in far north Queensland. I was undertaking field work for my new book, *'World's Weirdest Mosquitoes'*. The hotel booked is very famous in the area and part of a global chain. As per usual, my luggage was placed in the middle of the room, the bed pushed away from the wall, and bed linen removed to enable an inspection. My senses were alerted by the presence of a few small black spots along one side of the mattress beading (Figure 4). However in itself, this was not convincing enough to suggest bed bugs. But the spotting made me search with a renewed vigour and an enhanced level of attention. Low and behold, not only was more spotting noticed but also a cast skin. Again, no live bed bugs were seen, and a thorough inspection was not possible for the reasons outlined above. Like above, another room was demanded. Perhaps the most annoying aspect about this case was that I had specified while booking the room that it was to be free of bed bugs (I was advised to do this by a lawyer in the US, who would then sue the hotel if bed bugs were present!). I even dragged the manager up to the room to show them what bed bugs and their spotting looked like.

Unfortunately very few providers of accommodation in Australia (or elsewhere in the world) have procedural policies in place when it comes to bed bugs. In my opinion, this is extremely negligent, particularly as the global resurgence has now been going for two decades, and the details of the resurgence widely known, even within the hospitality industry. In Australia we have had our

industry standard, *A Code of Practice for the Control of Bed Bugs in Australia*, in place since 2005, and a procedural and policy guide for accommodation providers was made publicly available in 2011. Both are freely available from www.bedbug.org.au. I suspect it will only be when high profile legal cases occur, as has happened in the US, before hotels become more proactive when it comes to bed bugs.

Until (and if) the global bed bug resurgence wanes, then I would suggest the following when it comes to inspecting your hotel room for bed bugs. Firstly request a room with no bed bugs when booking. Prior to travel, pack a powerful torch (I recommend the LED Lenser range). Upon entering the room, place your bags in an open area. Pull the bed away from the wall and remove all linen. Then look. Look carefully along the mattress beading, especially close to the wall and low on the mattress. Inspect the skirting behind the bed and on the bed heads. If there is any evidence of bed bugs, take some images with your phone or camera, and head off to reception for another room. Being mindful of trying to educate the accommodation sector, I always take a copy of my field guide, *'Do You Have Bed Bugs'* and will give the hotel a copy if there is any hint of bed bugs in the building.

In the mean time, travel safe and you know the saying, "night, night..." ■





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The Secret Life of Flies

Erica McAlister

Book review by Stephen L. Doggett

In the last issue of the FAOPMA Magazine, the editors reviewed a series of new book releases from the world of pest control. In upcoming issues, we also intend to review some of the past classics. These are iconic books that will either greatly enhance your knowledge (which will ultimately improve your ability as a pest manager) or books that are of general interest that somehow relate to the industry. The first in the series of classic reviews is an astounding example of the latter, a superb book that focuses on flies, yet is still a relatively recent publication.

The Secret Life of Flies was released in 2017 and is the work of Erica McAlister who is the curator of Diptera (flies) at the Natural History Museum in London. Her love for these insects began at an early age and even admits that as a child she enjoyed watching maggots in a decomposing animal. With this sort of morbid fascination, it was inevitable that Erica was to become an entomologist! Her love of flies is very evident in *The Secret Life of Flies*. The figures, facts, and stories that Erica recounts, shows that she not only likes these insects, but is obsessed by them.

Sadly, as Erica points out, most insects tend to be ignored and it is only when these insects directly affect humans do we take any notice of them. And the reality is that flies are incredibly important to us. For example, the humble vinegar fly, *Drosophila melanogaster*, is the most widely used genetic model in existence. This species shares share around 75% of its disease-causing genes with humans, and thus it has become a perfect model for the impacts of drugs and various inheritable diseases.

It is noted in the text that flies have a huge economic benefit to us. According to Erica the economic worth of pollinators equates to around £120million (USD\$160million). Flies form a large component of this and are the main pollinator for many crops.

Flies...most important role is in the fertilization of *Theobroma cacao*...

Arguably however, their most important role is in the fertilization of the flowers of *Theobroma cacao*. You may recognise the species name, this is the cocoa tree from which that most important commodity is derived, chocolate. A small type of fly called a 'biting midge' from the family, Ceratopogonidae is crucial for the reproduction of this plant. Many biting midges are serious pests and are extremely aggressive biters. For example, in some parts of the north coast of NSW, Australia, real estate agents will only take prospective buyers to certain properties in the middle of the day, for they know that the swarm of biting flies that descend at dusk will send buyers running. Thus a lot of chemicals are applied to reduce biting midges numbers around the world, and if this is done to control the species that fertilises cocoa plants, then the global chocolate production becomes endangered. For me, (who just had a delicious hot chocolate while writing this review), such an outcome would be disastrous. Interestingly, Erica McAlister writes that she absolutely hates chocolate;

there must be something seriously wrong with this lady!!!

The Secret Life of Flies is full of fascinating quips and stories, and those anecdotes above are just a few of the many and varied examples on offer. The book is divided up into ten chapters and each is devoted to a theme, largely focusing on the diet of the particular flies under discussion. However, the first chapter focuses on the juvenile stages, namely the egg and the delightful maggot. After this there is a chapter of the pollinators, followed by those species that live in the dirt and decaying world around this. This is followed by the coprophages, i.e. those that eat...poo. Chapters then include flies that live in bodies, those that exist on plants and fungi, the predators, the parasites of other creatures, and finally the blood feeders.

Naturally in any review, critical commentary is always expected. Yet the truth of it is that it is hard to be negative about *The Secret Life of Flies*. Perhaps I would have liked to see some more images, as there are so many great shots of flies on the internet, especially with the mosquitoes. However, the photographs that are there are still very good. My only real complaint was the statement on page 213 that, "...many of the flies that suck blood...act as vectors...of some pretty nasty diseases." As a founding member of the Society for Keeping Entomological Entries True (SKEET), I do take a slight umbrage at this statement. The reality is that of those flies that do suck blood (which is almost all the mosquitoes, except for the magnificent *Toxorhynchites*), very few transmit pathogens of concern and in fact only around 1-5% of mosquitoes are either pests that bites us or are vectors. Most species are harmless and play an important role in the web of life such as fertilising plants or are food for other species. Thus statements that suggest most biting flies are bad is just Fake News (never thought I would quote Donald Trump, I should also note that I am the founder and sole member of

SKEET!).

Silliness aside, most of all Erica is a communicator and a superb orator of the written language. In fact you could say that her lyrical words are music to the mind! She uses wit in a way that is humorous, but never over the top. There is no question that Erica's heart and soul went into writing this book and result is one of the most fascinating and easy to read entomological texts available today, and I can thoroughly recommend this terrific tome. ■

The Secret Life of Flies is published by the Natural History Museum, London, and available from major book stores (\$USD16.17 from Amazon). COI Statement: one image of mine is published in this book, with no commercial benefits received.

The secret life of flies



Erica McAlister

FAOPMA Member News

The latest in happenings and events from the associations in our region

Please send your report to Stephen L. Doggett or David Lilly

PHILIPPINES

MERGER OF TWO LARGE ASSOCIATIONS

Almost two years ago after the FAOPMA member, Philippines, signed a Memorandum Agreement between the Pest Control Association of the Philippines (PCAP) and the Pest Exterminators Association of the Philippines (PEAP), they now have a formed a joint association, The United Pest Management Association of the Philippines (TUPMAPHILS). This merger will pave the way forward for FAOPMA-Pest Summit 2020 in Manila.

PEAP'S FIRST QUARTER TECHNICIANS' TRAINING

By Dir. Hermogenes G. Culminas

The Pest Exterminators Association of the Philippines, Inc. (PEAP, Inc.) has conducted its First Quarterly Technicians' Training Module: "Crawling & Flying Insects with an overview on Hotels & Motels 1". This was held 21 February 2019 at Manila City in the Philippines. The training module aims to augment members' knowledge and skills in waging pest management battles.

The day was attended by 139 participants comprising Pest Control Technicians (PCT's), with some Pest Control Operators (PCO's), emanating from all over the Philippines. The event was personally supported by the President, Danilo L. Magpantay (Owner, Bugkil Pest Management Services), who provided two presentations. There were, *Pest Control & Its Objectives* and *Treatment Overview on Hotels and Motels*. The PEAP Secretary,

Clark Henry P. De Paz (Part-Owner, Briones Pest Control Services), topic was *Pest Control Laws & Regulations-Philippines' Sanitation Code 856*.

PEAP Honorary member Mr. Alfred Reyes (Operations Manager, Regency Pest Control) was in-charge of the group dynamics during the workshop. He motivated participants to join in the discussions and role playing activities. This helped to achieve the workshop goals, as attendees had to come up with specific strategic solutions for a given pest infestation in hotels and motels. Furthermore, this had to be done under the regulations of the Sanitation Code of the Philippines.

Others who also supported the training included: Auditor Cescar Siy (Owner, Regency Pest Control), P.R.O. Randel Porras (Owner, Wipe Out Pest Control), Dir. Ma. Carmelita M. Lopez (Owner, Bell Pest Control), Dir. Giovanni Villela (Owner, Great Eastern Termite and Pest Control Services), Dir. Hermogenes G. Culminas (Owner, Property Pest Control & General Services), Dir. Michael Clemente (Owner, Zool Pest Control), Past Pres. Virgencita Jawid (Owner, JACOMPEST Enterprise), Immediate Past Pres. Job Dayandante (Owner, Aim Pest Control Philippines Corp.), Mr. Angelo Llamas Roa Yu (Owner, DPP Pest Management Services), and Ms. Genoveva B. Cruz (Owner, Termite Pest Specialist & Trading Company).

PEAP's Second, Third, and Fourth Quarterly Technicians' Training, will be conducted within this calendar year.

40TH PEAP FOUNDING ANNIVERSARY AND PAST PRESIDENTS' HOMECOMING

By Dir. Hermogenes G. Culminas

San Juan City, Philippines. The Pest Exterminators Association of the Philippines, Inc. (PEAP, Inc.)

PEAP First Quarter Technicians' Training, Feb. 21, 2019

Jollibee-Taft, Taft Ave. cor. Vito Cruz St., Malate, Manila, Philippines



PEAP Pres. Danilo Magpantay as speaker on the Two(2) Topics: Pest Control & Its Objectives, and Treatment Overview on Hotels and Motels



Sec. Clark Henry P. De Paz, speaker on Pest Control Laws & Regulations-Philippines' Sanitation Code 856.



Mr. Alfred Reyes, In-Charge of the Group Dynamics During the Workshop



Attendees Taking Down Notes About the Topics



PEAP Secretariat Headed By Mr. Ric Dognidon (Left), Ms. Genoveva Cruz (Center) & Ms. Ma. Carmelita Lopez



Group Picture of the 40th PEAP Founding Anniversary Attendees



PEAP Pres. Danilo Magpantay Proposing a Toast



Dir. Theresa Villegas Receiving the Award in Behalf of Her Husband, the late PP Leo Villegas



From Left: Sec. Ric Dognidon, PEAP Pres. Danilo Magpantay, Alvin Estrella, Jr., Mirafior Cabalan, Margarette Briones, Alfred Reyes



From Extreme Left: Nelson Obach, Fae Ofren, Dir. Randel Porras, Sec. Clark Henry De Paz, Ms. Catherine Baisas, EVP/LEADS EH Receiving the Award in Behalf of Her Father Mr. Fernando Malveda, & PEAP Pres. Danilo Magpantay

ardently celebrated its 40th Foundation Anniversary and Past Presidents' Homecoming with a tribute to the old and new members. A special focus was for the Past Presidents by way of awarding them personally and through their proxies with Plaques of recognition for their invaluable contributions.

Braving the heavy traffic to Club Filipino on 7 March 2019 were 120 old and new PEAP Members, including eight Past Presidents, namely: PP Giovanni "Ging" Olivarez (1982-83) now President of Malate Construction and Development Corporation, Madrigal Business Park, Ayala Alabang, Muntinlupa City; PP Atty. Silverio Garing of Regal Pest Control

Co. (1995-1996), the Registrar of the Muntinlupa City Registry of Deeds for several years; PP Virgencita G. Jawid (2015-2016), owner of JACOMPEST Enterprise; IPP Job Dayandante (2013-2014, 2017-2018), owner of Aim Pest Control Philippines Corp.; with proxies: PP Leo Villegas (1981-1982), the First Filipino to become FAOPMA President (2010-2011), owner of Macodyn, Inc. represented by his beloved wife, Mrs. Theresa Villegas; PP July Salazar of Multi-Pest Services Corporation (1989-1992, 2004-2006) duly represented by his loving wife, Ms. Norma Salazar; and PP Col. Marcelo Roa Yu of Emar Merchandising and Pest Control Services (1979-81, 1983-84, 1988-89), the First PEAP President proudly represented by his son Mr. Jason Roa Yu of JRY Pest Management.

Also given due recognition were the 12 Associate Members who have been supportive of the PEAP Activities, viz: Alog & Company, Inc., BASF Philippines, Inc., Diversified Agrochemicals Trading Corp., Ensystex Philippines, Inc., FHREG Sentri Corp., LEADS Environmental Health Products Corp., Le Firenze Marketing & Management Corporation; Pycor, Inc., Syngenta Philippines, Inc., Upgreen Corp., J.B. Guevarra & Sons, and Bio-Entomological Service & Trading International.

The current Board of Directors were also recognized: Pres. Danilo Magpantay, Vice-Pres. Alvin Estrella, Treas. Angie Roa Yu, Auditor Cescar Siy, P.R.O. Randel

Porras, Sgt. @ Arms Teodoro Dela Cruz, Secretary Henry Clark De Paz, Directors: Giovanni Villela, Ma. Carmelita Lopez, Theresa Villegas, Hermogenes G. Culminas, Norma Salazar and Michael Clemente. This was undertaken with the assistance of the Masters of Ceremonies Mr. Nelson Obach and Ms. Fae Ofren thru the magnanimous effort of the 40th Foundation Anniversary Chairman, Mr. Alfred Reyes.

Graciously sponsored this momentous event were LEADS Environmental Health Products Corp. through its CEO Mr. Fernando "Erdie" Malveda represented by his daughter Ms. Catherine Baisas, EVP; and Macodyn, Inc. through its owner Ms. Theresa

Villegas.

Another highlight of the event was the singing of the PEAP Hymn by the singer-composer Mr. Alvin Estrella, Jr. and the remarkable presence of some Officers from Pest Control Association of the Philippines headed by its current President, Mr. Felix Lazo; Pres. Jess Asistin of TUPMAPI and KAPESTCOPI Pres. Jose Renato Aquino.

For four decades, PEAP has produced 22 Presidents over 27 terms, with 62 Active Regular and 12 Associate Members. It has already greatly contributed in the prevention of 'womb to tomb' diseases caused by pest infestations. We have achieved this via developing proper technical, educational and methodological expertise.

PEAP, under the able leadership of its current President, Mr. Danilo Magpantay, will continuously grow stronger and bolder in waging pest management battles with the advent of the latest pest control technology, educational, technical advancement and with the concerted efforts of all its members and stakeholders in protecting public health and environment, which mission and vision will be its battle cry against any pest infestations threatening the Filipino citizenry and the whole of humanity.

NEW ZEALAND

PYRETHROID REVIEW

As of late 2018, the New Zealand Environmental Protection Agency (NZEPA) has decided to review quite a few pyrethroids. The NZEPA are concerned about the use patterns of the pyrethroids. While this mostly to amateur use in home garden, but unfortunately the pest management industry has been affected by this review. For example, a number of companies have submitted applications for registration, however as some contain pyrethroids in the above review, all registrations have been put on hold pending the



The 2019-2020 PEAP Board of Directors

review

More of this decision can be viewed at: <https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP203683/APP203683-Final-Decision.pdf>

FRUIT FLIES

Exotic fruit flies have been found in the north island of New Zealand, around the major city of Auckland. This has included a Queensland fruit fly and a Facialis fruit fly. This has prompted restrictions on the movement of fruit and vegetables within the area, and an extensive surveillance program encompassing trapping and inspection of fruit. To date no fly larvae have yet been discovered. For more information: <https://www.biosecurity.govt.nz/protection-and-response/responding/alerts/fruit-flies/queensland-fruit-fly/>

NEW PRESIDENT FOR PMANZ

The Pest Management Association of New Zealand (PMANZ) has announced a new incoming President, Mr. Mike Collins. Mike has a long and stellar career in the industry with over 30 years' experience. He was the General Manager of Rentokil in Fiji and Divisional Manager of Ecolab. Currently he is Operations Manager of Ajet services. Mike is a past President and replaced outgoing President, Sandra Charlton.

POPLAR SAWFLY

Exotic pests have the potential to cause major damage to New Zealand's fragile ecosystems, and the agricultural and forestry industries. For this reason, Biosecurity New Zealand runs a Gypsy moth monitoring program. Recently the program detected larvae of the poplar sawfly and this was a new detection for the nation. The species is not known to cause major damage although the organization is currently undertaking a risk assessment on the species. More information: <https://www.newshub.co.nz/home/rural/2019/03/exotic-insect-discovered-in-new-zealand-for-the-first-time.html>

MASSIVE WASP NEST FOUND

A huge nest of German wasps (*Vespula germanica*) was found near Rotorua in the north island of New Zealand. The nest measured 2m wide by 2 m tall. The pest controller asked to treat it, claimed it was the biggest nest he had seen in some 30 years of undertaking wasp control. The size of the job meant that almost 10 times the amount of insecticide was required to control the nest, compared to a normal size nest, and that it would take four days to complete the job. It was estimated that over one million wasps were housed in the nest.

More information: https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=12210431

Thank you to Peter Barry (PMANZ) and Gerwyn Jones (Pelgar) for supplying the stories from New Zealand. ■

News Items

A compendium of pest management news items from the media relevant to FAOPMA member countries

Compiled by Stephen L. Doggett and David Lilly

USING DEAD RATS TO SMUGGLE CONTRABAND INTO PRISON!

Dead rats have been used by criminal gangs to smuggle drugs, phones, and other contraband into Dorset Prison in the UK. The items were sown into the rats and then thrown over the perimeter fence. Perhaps the most disappointing aspect of the article was that it failed to mention the species used!

Source: *The Guardian* (25/Mar/2019), www.theguardian.com/society/2019/mar/25/gangs-using-dead-rats-smuggle-drugs-uk-prisons?CMP=Share_iOSApp_Other

BANGLADESH: HOW NOT TO FOG FOR MOSQUITOES!

A story below mentions of a major mosquito problem at Dhaka International airport. The issue has been so bad that planes have been delayed departure with cabins becoming full of mosquitoes. The image in the following link will give you an idea of just how bad the mosquitoes are:

www.thedailystar.net/city/high-court-question-authorities-failure-curb-mosquito-menace-at-dhaka-airport-1714033

In response to the problem, the local authorities posted on Facebook a video of them fogging mosquitoes. Try and count how many things that are wrong with this process!

<https://www.facebook.com/dncc.gov.bd/videos/1701736219847588/>

Here are a list of our observations of the issues here:

- the area was not cleared of people prior to commencement of spray.
- the spraying was not stopped when people were obviously going to be directly sprayed (see the two security guards at the start of the video coping a face full.
- inappropriate personal protective equipment. A cloth over the face offers no protection against gaseous

vapours. A half or full face respirator is required, with the appropriate charcoal filters. Likewise operators should be appropriately attired with protection clothing.

- spraying above plants (the fog should be sprayed at the base of the plant).
- inadequate coverage (note how only the closest bushes receive any treatment).
- spraying into thin air (no mosquitoes there, complete waste of chemicals).
- spraying during the day (it is clear that convection currents are causing the chemical to rise, rather than float and spread at ground level, this immediately should have put a halt to the treatment).
- unnecessary personal involved (during chemical applications only those personnel directly involved in the treatment should be present).

Clearly there was a political imperative to do the treatment and filming was undertaken for the cameras to show that something was being done. However, no consideration was considered regarding the quality of the treatment. Improper spraying can lead to non-target impacts, increases the risk of insecticide resistance development, and can lead to other unintended consequences. Such 'displays' must be soundly condemned.

ASIA/PACIFIC: DENGUE UPDATE

Sri Lanka: 8,900 cases in the first two months of 2019.

India: Dengue cases rise four fold.

Vietnam: 3,275 cases in Khanh Hoa Province for this year.

Indonesia: 2,282 cases and one death.

Malaysia: 28,580 cases and 49 deaths up to 9/Mar/2019.

Cambodia: >1,000 cases in 2019.

Thailand: almost 10,000 cases this year.

Philippines: 40,614 cases up to 14/Mar/2019. This is 68% higher than last year for the same period.

Reunion: 179 dengue cases in one week up to late

February.

Source: *Promed Digest* (17/Mar/2019), Vol. 81(46).

AUSTRALIA: BARMAN FOREST VIRUS OUTBREAK IN TASMANIA

Barmah Forest virus (BFV) is a mosquito-borne disease spread by various species of mosquitoes throughout Australia. While it is present on mainland Australia, the first local cases of transmission in Tasmania have been reported, with some five cases notified (note an outbreak is defined as 'more than usual', thus one case can be an outbreak if there are normally none). The cases have occurred from the eastern areas of the state and the most probable vector is *Aedes camptorhynchus*, the southern saltmarsh mosquito (SLD: BFV causes rashes, fevers, muscle and joint pain, and is non-fatal. Every year there are around 1,000 cases annually. I have published quite extensively on this virus and these papers can be obtained from my ResearchGate page; search on my name).

Source: *Promed Digest* (17/Mar/2019), Vol. 81(44).

AUSTRALIA: MAGGOTS FOUND IN HEAD WOUND IN ELDERLY RESIDENT

An elderly patient at an aged care facility in NSW has been found with live maggots in a wound in their head. Unfortunately, the same facility where the patient lives has come under scrutiny over several issues relating to patient care. The patient is now receiving treatment (SLD: the infestation of wounds, called 'myiasis' is not all that uncommon and can occur in post-operative wounds if flies can enter the medical facility. Understandably, hospitals tend to keep such occurrences very quiet!)

Source: *ABC News* (12/Mar/2019), <https://www.abc.net.au/news/2019-03-12/maggots-found-in-residents-head-wound-at-bupa-facility/10893240>

BANGLADESH: MOSQUITO CONTROL NEGLIGENCE AT DHAKA AIRPORT

The High Court of Bangladesh has raised questions about the negligence of the authorities at Dhaka airport to manage their inherent mosquito problem. The Court sought reasons why the negligence would not be declared illegal (SLD: under the World Health Organization, countries have an obligation to ensure that mosquito breeding at ports is minimised to prevent spread to other countries.)

Source: *DhakaTribune* (12/Mar/2019), www.dhakatribune.com/bangladesh/court/2019/03/12/hc-questions-authorities-negligence-to-curb-mosquito-menace-at-dhaka-airport

INDIA: KINGFISHER STUCK IN RODENT TRAPS

A white-throated kingfisher was found in Mumbai stuck in a glue trap used for capturing rodents. A wildlife veterinarian spent more than two hours freeing the bird ensuring that it was not harmed in the process. Local animal activists say that it is not uncommon for small mammals and birds to be captured and subsequently die in glue traps. (SLD: with stories like this, it is completely

understandable why so many animal right groups wish to have glue traps banned. Pest Control Operators have a professional duty to ensure such devices are placed where wildlife can never come in contact with the traps. I find it astonishing that people can be so careless in the placement of rodent glue traps and such recklessness with expedite the demise of this type of trap.)

Source: *The Times of India* (12/Mar/2019), <https://timesofindia.indiatimes.com/city/mumbai/kingfisher-stuck-in-glue-pad-for-rats-freed-after-2-hour-effort/articleshow/68367818.cms>

CHINA: 40 DEAD COCKROACHES IN A TAKEAWAY MEAL!!!

A woman in China ordered a meal from an online food delivery service provider and noticed a dead cockroach in the meal. She then carefully went through the dish and found it had a whole stack of friends – some 40 cockroaches in total. You can watch a video of her in the link below, picking out all the cockroaches and placing them onto paper towel. The cockroaches were largely hidden by the similar colour of the meal. The local Food and Drug Administration were notified and currently investigating the incident.

Source: *LatestLY* (11/Mar/2019), <https://www.latestly.com/social-viral/chinese-woman-finds-40-dead-cockroaches-in-her-takeaway-meal-watch-disgusting-video-687517.html>

TAIWAN: RATTUS SOUPUS

A diner from Hsinchu City in Taiwan was feasting on a bowl of mutton hot pot when he found a dead rat floating in his dinner. He took several images which were posted to social media. The restaurant concerned refunded his meal of rat, but provided no further compensation.

Source: *Lad Bible* (11/Mar/2019), <http://www.ladbible.com/news/food-man-shocked-to-find-dead-rodent-floating-in-his-stew-20190311>

AUSTRALIA: YELLOW CRAZY ANT

The Yellow Crazy Ant (*Anoplolepis gracilipes*) has been identified in northern NSW, around Lismore and the Terania Creek area. Now the Department of Primary Industry is undertaking a surveillance blitz of the area with plans to inspect over 600 properties. The Yellow Crazy Ant are considered a serious environmental pest.

Source: *Echo Daily* (21/Feb/2019), www.echo.net.au/2019/02/yellow-crazy-ant-blitz-in-lismore/

INDIA: RODENTS ON TRAINS IN AGRA

Rodents are a major issue on trains in the region of Agra in central northern India. One woman while waiting in a first class lounge looked down to find a rat as 'fat as a rabbit' feasting on her sandwich. In the past, an engineer had his fingers nibbled on by a rat and other guests have been bitten. Rats also chew on wires and cables, and can do serious damage to infrastructure. Thus the local railway authority is instituting a new rodent control program.

Source: *Times of India* (5/Mar/2019), <https://timesofindia.indiatimes.com/city/agra/rodents-pests-bleeding-railway-coffers-agra-div-alone-to-spend-rs-24-lakh-for-pest-control/articleshow/68260393.cms>

CHINA: LIVE COCKROACH PULLED OUT OF GIRLS EAR

A 17 year old girl in China experienced pain in her ear. Upon medical inspection, doctors pulled a live cockroach out of her ear canal. It is thought that the cockroach may have entered to feast on her ear wax (SLD: can cockroaches get any more disgusting?)

Source: *Daily Mail* (5/Mar/2019), <https://www.dailymail.co.uk/news/article-6769261/Girl-17-live-cockroach-pulled-ear-crawled-asleep.html>

SINGAPORE: RATTY RICE

The government body, the Agri-Food and Veterinary Authority, is investigating an incident of a dead rat being found within a bag of basmati rice. The rice is packed in India and the product has been recalled pending investigation.

Source: *Channel NewsAsia* (4/Mar/2019), <https://www.channelnewsasia.com/news/singapore/ava-investigating-dead-rat-rice-sheng-siong-11307282>

TAIWAN: NEW TERMITE SPECIES FOUND

A new species of termite has been discovered in Taiwan, the first to be found and named by local scientists. A/Prof. Li Hou-feng and Liang Wei-ren, from the National Chung Hsing University, found the termite feeding on tree trunks in the east of the island nation. The termite was named *Stylotermes halumicus* after a local term 'halum', which means pangolin.

Source: *Focus Taiwan* (1/Mar/2019), <http://focustaiwan.tw/news/aedu/201903010012.aspx>

INDIA: KYANSANUR FOREST UPDATE

With a public inquest relating to the latest outbreak Kyansanur Forest disease (KFD), the court has been told that 8 people have died this year and some 189 tested positive Shivamogga, Uttara Kannada, and Chikkamagaluru districts. Questions have been raised regarding the adequate supply of the vaccine to people in the region.

Source: *Promed* (1/Mar/2019), Vol. 81(4).

TICK BITE RESULTS IN ALLERGY TO EATING MEAT

Mammalian Meat Allergy (MMA) is a condition whereby a person can develop an allergy to the consumption of meat following the bite of certain tick species. Basically the tick injects a carbohydrate called 'alpha-gal', which was thought to have come from a previous blood meal from some animal host. In the latest research, it appears that a tick can induce MMA without feeding on an animal. (SLD: MMA was first described from Australia by the immunologist, A/Prof. Sheryl van Nunen who noticed a link in patients with unexplained anaphylaxis and what they had recently eaten. The one thing in common with all the patients is that they had been bitten by a tick.

Now there has been more than 800 cases described from Australia alone, which is the global hot spot for MMA. A/Prof. Nunen established a committee called 'TiARA' to raise the awareness of this condition and the allergies caused by ticks. The web site, www.tiara.org.au, contains a lot of information on the condition for patients).

Source: *US News* (27/Feb/2019), www.usnews.com/news/health-news/articles/2019-02-27/tick-bites-more-likely-to-cause-red-meat-allergy-than-thought

FAT RAT SAVED

While most of us in the pest management have the task of removing rats, (permanently), recently a group of people were tasked to save the life of a very fat rat. A young girl in Bensheim, Germany, found a rat trapped in a sewer cover. The rodent had become fat during the winter months while running around the sewers and in trying to get out through the cover, became firmly wedged in the lid. A rescue team of eight were called in to save the furry beast and it was released unharmed.

Source: *ABC* (27/Feb/2019), <https://www.abc.net.au/news/2019-02-27/rat-saved-from-manhole-by-german-animal-rescuers/10852558>

INDONESIA: WORLD'S LARGEST BEE DISCOVERED (AGAIN!)

The world's largest bee, known as Wallace's giant bee (*Megachile pluto*) after the famous ecologist who first described it, has been rediscovered after not being seen for almost four decades. Now this bee is large; it has a wing span of 6cm and a body length of around 4cm. Plus it has a massive set of jaws and is described as a "flying bulldog". It uses the jaws to dig into termite mounds where the bee makes its nest. Currently this species is listed as "vulnerable to extinction" by the International Union for Conservation of Nature. Sadly there are no restrictions on the trade of this bee, which could facilitate its extinction.

Source: *BBC News* (22/Feb/2019), www.bbc.com/news/science-environment-47311186

BED BUGS: HOW NOT TO RESPOND WHEN YOUR CUSTOMER IS BITTEN

A couple spent UK£3,000 on a holiday to a five star resort in Cape Verde, a small island group of the coast of west Africa. While staying at the resort, the couple received horrendous bites from what they claimed were bed bugs and shared their bite reactions on social media. They were forced to sleep fully clothed to avoid further bites. Following lodging a complaint, the travel agency stated in a written reply that "Insects are an inevitable product of hotter climates" (SLD: this is a dreadful response to a serious situation and totally inadequate. I can understand the couple sharing their plight on social media.)

Source: *Daily Mail* (22/Feb/2019), https://www.dailymail.co.uk/travel/travel_news/article-6729557/Holidaymaker-shares-photos-bed-bug-horror-3k-Cape-Verde-Tui-trip.html#newcomment

AUSTRALIA: A RODENT BECOMES THE FIRST CLIMATE CHANGE EXTINCTION

An Australian rodent, *Melomys rubicola*, is believed the first species to have become extinct due to human induced climate change. The species was only found on a small island in the Torres Strait known as Bramble Cay. The island measuring only around 50x100m is off the coast of Papua New Guinea underwent a storm surge, which believed to have drowned the remaining population. The report states that the root cause of the extinction was sea level rise associated with global warming. Sadly, neither the Queensland or Australian governments did anything to support the saving of this species.

Source: ABC (20/Feb/2019), www.abc.net.au/triplej/programs/hack/bramble-cay-melomys-first-climate-change-mammal-extinction/10830080

INDIA: REFRIGERATOR DRIP PANS PRODUCE MANY MOSQUITOES

In a survey undertaken by the Municipal Corporation of Gurugram, the drip pans of refrigerators were found to produce more mosquitoes than other sites within the home. One in three houses were identified with mosquito infested drip pans during the survey.

Source: *The Times of India* (17/Feb/2019), <https://timesofindia.indiatimes.com/city/gurgaon/fridges-drip-pan-a-mosquito-breeding-hotspot-in-households-finds-mcg-survey/articleshow/68029608.cms>

DENGUE UPDATE, 17/FEB/2019

Sri Lanka: there has been 2 deaths and over 3,740 cases in the first three weeks of January.

Nepal: one case in Kathmandu was reported.

Pakistan: 166 cases have been reported since 1/ Jan/2019.

India: 70 people have been tested positive for dengue virus in Pune.

Indonesia: there have been 176 deaths and 16,692 cases for 2019, with East Java having the highest numbers (3,074 cases and 52 deaths), up until 7/Feb.

Malaysia: 973 cases and 2 deaths.

Philippines: 2,132 cases and 26 deaths.

Taiwan: the first local case for three years was reported.

Maldives: 107 cases of dengue reported with 16 from the capital Male.

New Caledonia: 319 cases reported for 2019.

Palau: 77 cases for this year.

Source: *Promed Digest* (17/Feb/2019), Vol. 80(55).

RAT ERADICATION PROGRAM ON SOUTH GEORGIA ISLANDS SUCCESSFUL

On South Georgia Islands in the southern Atlantic, rats were introduced onto the island by whaling vessels some 250 years ago. The result was devastating for the natural bird life of the islands. A ten year rat eradication program costing USD\$14million involved rat poison being dropped from helicopters have proved successful. The island has been declared rat-free as of last year. This has ensured the island has once again become a haven for birds and it is

estimated that the bird life will triple in the next few years

Source: CBC News (12/Feb/2019), www.cbc.ca/news/canada/calgary/brian-keating-king-penguin-colonies-south-georgia-island-archipelago-1.5016192

AUSTRALIA: ANT INFESTATIONS PLAGUE GOLD COAST

In the northern sections of the Gold Coast in southeast Queensland, Australia, residents are being plagued by ants. Some are saying that they can only stay outdoors for a couple of minutes before being attacked. Furthermore, they are coming indoors covering food surfaces and even eating glues in shoes. One local said that she cannot even leave her eight week old unattended for fear of attack.

A local pest controller is saying that the lack of rain is forcing ants indoors to seek food and water

Source: *Gold Coast Bulletin* (13/Feb/2019), www.goldcoastbulletin.com.au/news/sun-community/ant-infestation-plagues-northern-gold-coast-homes/news-story/046137b3aee649f314f7b8fa37aadf4a

SOUTH PACIFIC: ZIKA AND DENGUE VIRUSES IN HORSES

Both dengue and Zika viruses are endemic to many South Pacific islands. Researchers have now found that horses in the region are regularly infected with these viruses. As to if horses play a role in the spread of these viruses have yet to be ascertained.

Source: *ProMed-ahead Digest* (13/Feb/2019), Vol. 79(26).

SINGAPORE: TWO DENGUE DEATHS IN THE FIRST SIX WEEKS OF 2019

Already for 2019, there have been two deaths attributed to the mosquito-borne disease, dengue. Both cases were residents in their 70's and they lived close to Paya Lebar air base, in the north east of Singapore. National Environmental Officers have conducted mosquito control operations in the area. In 2018, there were 3,285 dengue cases in Singapore, as 20 per rise upon the previous year, with five deaths.

Source: *The Independent* (12/Feb/2019), <http://theindependent.sg/take-mosquitoes-seriously-two-deaths-in-first-six-weeks-of-year/>

MALAYSIA & SINGAPORE: BED BUGS ON BUS

A Malaysian girl recently took a bus from her hometown of Taiping to Singapore and suffered multiple painful bites, with some of them developing into blisters (bullous eruptions), which required medical treatment. Bed bugs were blamed as the cause and the insects were suspected of hiding in the seats. According to the report, the bus line, Starmart, has been the subject of several bed bug complaints in the past (SLD: bed bugs in mass transport is a growing issue and there are multiple reports of these insects occurring on ships, aircraft, trains, as well as buses).

Source: *World of Buzz* (12/Feb/2019), www.worldofbuzz.com/msian-suffers-painful-blisters-rashes-from-bed-bugs-after-taking-bus-ride-to-singapore/

MAGGOT MASSES DEVOUR MONSTER MEALS

Maggots (fly larvae) working together can rapidly devour foods. For example, they can eat an entire pizza in two hours (see video in link below). It has now been suggested that perhaps maggots can be employed as waste disposal units to help rid the world of rubbish (SLD: sadly the report did not say what would be done with the mass of adults flies that emerged!)

Source: ABC News (12/Feb/2019), <https://www.abc.net.au/news/2019-02-12/maggot-fountain-eat-pizza-two-hours-feeding-structure/10803048>

BUG COLLECTING BARBIE!

Famous toy maker, Mattel, has now introduced a new figure in the range of dolls; Entomologist Barbie. She comes complete with a range of insects. This new Barbie is the result of the collaboration with National Geographic such that a range of intellectual Barbies have now been produced. This has included astrophysicist Barbie, marine biologist Barbie, and wildlife conservationist Barbie (SLD: who said blondes are dumb?). Mattel has been highly criticised over the Barbie range, with feminist groups stating that these blond dolls are stereotypical and unrealistic, as they portray some unobtainable ideal of the female form. It is true that entomologist Barbie does not reflect a real insect worker; she is not covered in mud or have bed bugs and cockroaches crawling all over her (as you do in such infestations). Plus pink is probably not the ideal colour to wear into the field.

Source: *The Guardian* (12/Feb/2019), <https://www.theguardian.com/commentisfree/2019/feb/11/meet-entomologist-barbie-still-white-pink-and-unattainably-thin>

MYANMAR: NEW MOSQUITO FROM FOSSIL RECORD

A new mosquito found preserved in amber dating back some 100 million years has been found in Myanmar. The species named *Priscoculex burmanicus*, is thought to be related to the Anophelines mosquitoes, which are the vectors of malaria. Whether or not malaria existed back then is the subject of debate.

Source: *ScienceDaily* (11/Feb/2019), www.sciencedaily.com/releases/2019/02/190211163959.htm

COCKROACH EXHIBITION

If you are happening to be travelling to Europe anytime soon, you may wish to visit the historic city of Dubrovnik in Croatia. The Croatian Natural History Museum has a cockroach exhibition running until 6/May/2019. For Game of Thrones fans, the museum is next to the famous stairs where Cersei Lannister was forced to stroll naked in the famous 'walk of atonement' scene.

Source: *Total Croatia News* (10/Feb/2019), www.total-croatia-news.com/travel/34069-cockroach-exhibition-dubrovnik-natural-history-museum

MCMOUSESHAKE?

A man in Ohio, USA, claims that McDonalds served him a milkshake containing a live mouse. He is now seeking USD\$100,000 in damages. The owner of the branch is stating that the claim is 'wildly fabricated and false' (SLD: it is hard to imagine that a food server would not have noticed a mouse within a cup.)

Source: *New Zealand Herald* (9/Feb/2019), www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=12202313



The new Entomologist Barbie. Will we soon see Pest Manager Barbie, such as Termite Barbie? Rodent Barbie? Cockroach Barbie? Bed Bug Barbie has a certain ring to it!

DIET DRUGS TO STOP MOSQUITOES DESIRE FOR BLOOD

After a mosquito blood feeds, they will not bite again until after they lay their eggs. A group of researchers asked the question, could they use continue to suppress this non-feeding behaviour by using the insects' own chemicals. Various molecules called 'neuropeptides' are involved in this feeding inhibition and so the researchers fed the mosquitoes on these chemicals. Indeed it did work, and mosquitoes failed to feed for two days. The challenge will be how to get mosquitoes in the wild to feed on the chemicals, however if blood feeding was suppressed for only a short period, this could significantly reduce the risk of mosquito-borne diseases.

Source: *Nature* (7/Feb/2019), www.nature.com/articles/d41586-019-00511-4

AUSTRALIA: COCKROACH INVASION

In Adelaide, South Australia, there are reports of a major invasion of cockroaches into homes. This is being blamed on the heatwave, with extremes in temperature and low rainfall, with no precipitation recorded for 50 days. As a consequence, the cockroaches are entering homes to find a cool refuge. The main species people are seeing is the American cockroach, *Periplaneta americana* (SLD: another unexpected consequence of climate change?)

Source: *The Advertiser* (7/Feb/2019), www.adelaidenow.com.au/news/south-australia/sas-breaking-news-blog-the-pulse-adelaides-dry-spell-officially-enters-50th-day-almost-no-chance-of-rain-on-friday/live-coverage/d86575c01fa827a44781d639614a7eb7

MALAYSIA: RATS IN HOSPITAL CANTEEN

The Health Department in Johor has forced the canteen in Sultan Ismail Hospital to close down for two weeks after images of a rat on food trays was spread on social media. According to the report, the canteen failed to follow legislative guidelines under the Food Act.

Source: *The Star Online* (7/Feb/2019), www.thestar.com.my/news/nation/2019/02/07/rat-sighting-shuts-hospital-canteen-johor-health-dept-orders-hsi-eatery-closed-for-two-weeks-after-p/

BED BUGS AND CINEMAS

Ever since the first cinemas opened in the early 1900s, bed bugs have invaded these sites. People bring in bags, which may be infested with bed bugs, and human turnover is high. Furthermore, cinemas are dimly lit, making bed bugs hard to see. As the bite reaction is often not immediate, people may not link their allergic spots to bed bugs in the cinema they visited a few days previously. More indications of bed bugs in cinemas have emerged, with reports from the US and Luxembourg. In response to the latter, the art house cinema, Cinémathèque in Luxembourg, shut down for three months during the treatment process. In the future, bed bug detection dogs will be used to inspect bed bugs on a monthly basis (SLD: bed bugs in cinemas are a real nightmare and I have been involved in several cases. Infestations tend to take a long time to be recognised, and by that stage, have

spread widely from the original seat. Sanitation tends to be poor; underneath seats you find a mass of popcorn, rubbish, and loose change. The sites are very dimly lit and so artificial lighting is necessary. Often seats need to be completely dismantled and surface sterilised with steam, or even fumigated. The whole process is time consuming and expensive, and control costs approaching USD\$10,000/theatre are not uncommon. Thus it is easy to understand how the Luxembourg cinema was closed for three months.)

Source: *Luxembourg Times* (8/Feb/2019), <https://luxtimes.lu/culture-life/36433-cin-math-que-reopens-after-bedbug-infestation> and *Datebook* (7/Feb/2019), <https://datebook.sfnchronicle.com/movies-tv/the-last-picture-show-amc-van-ness-to-close-immediately>

AUSTRALIA: CONCERNS OVER FIRE ANT PROGRAM

Following a series of complaints, a public education session was held over the fire ant eradication program in southeast Queensland and hosted by Biosecurity Queensland. Many landowners considered that the meeting was just political double speak and they were 'fobbed' off by the officials present. The concern is around the baits being used and that some of the organic farmers may lose their organic certification. In contrast, Biosecurity Queensland claims there has been a lot of public consultation and most of the concerns are being addressed (SLD: while sympathy can be had for organic farmers, fire ants pose a national biosecurity risk and they must be eradicated at all costs. Hopefully governments can adequately compensate any of the farmers affected.)

Source: *Star* (7/Feb/2019), www.gattonstar.com.au/news/fire-ant-program-info-session-leaves-questions-una/3642288/

AUSTRALIA: ZIKA-RESISTANT MOSQUITOES DEVELOPED

Scientists from Australia and the US have engineered a mosquito that will resist spreading Zika virus. Potentially, this strain of *Aedes aegypti*, could be used to displace the native type that can spread the virus. To achieve this, the researchers injected an anti-Zika gene into the developing embryos of the mosquitoes, along with a gene that produces red eyes, so that the modified mosquitoes could be distinguished (SLD: Zika virus occurs in many parts of the world where *Aedes aegypti* occurs, including Asia. The virus became particularly prominent following a major epidemic in Brazil during 2015 whereby many babies were born with birth defects such as microcephaly, as a result of the pregnant mother becoming infected with the virus).

Source: *scimex* (6/Feb/2019), www.scimex.org/newsfeed/scientists-develop-zika-resistant-mosquitoes

WISH TO AVOID MOSQUITOES? PAINT YOUR WALLS WITH AN ANTI-MOSQUITO PAINT!

Launched late last year, is an anti-mosquito paint from the company Plascon. This is not designed to repel mosquitoes, but to kill them on contact. The paint contains the pyrethroid, permethrin, and the

manufacturer claims efficacy for two years. It is to be used indoors against malaria mosquitoes (SLD: considering that insecticide resistance to the pyrethroids is so widespread, including in the regions where this product is being sold, notably Africa, it is hard to imagine that efficacy will be high. Interestingly, the manufacturer fails to discuss the issue of resistance in their product spiels. Note also that paints incorporating insecticides have been around for some time.)

Source: *SoftPower News* (6/Feb/2019), www.softpower.ug/museveni-launches-plascons-anti-mosquito-paint/

AUSTRALIA: USING RODENTS TO CONTROL COCKROACHES

A proposal has been put forward by researchers at the University of Sydney to control cockroaches with rodents. Water rats, a native species to Australia, can be trained to hunt cockroaches. If the cockroach trial is successful, then the rats will be trained to hunt Asian House geckos, which has invaded large parts of Australia (SLD: to be honest, I cannot imagine many situations where rodents would be used over baits, which are so effective at killing cockroaches...time well tell.)

Source: *10 Daily* (7/Feb/2019), <https://tendaily.com.au/news/australia/a190201qdb/the-brazen-new-plan-to-pit-rats-against-cockroaches-in-sydney-streets-20190206>

COURT IN US CLOSED DUE TO BED BUGS

A courthouse in the US was closed after the judge spotted bed bugs on the clothing one of the lawyers. According to the report, the lawyer laid his coat on some files and the bed bugs fell out. The decision to close the court was to protect the public from this insect and the site was promptly treated.

Source: *TulsaWorld* (5/Feb/2019), www.tulsaworld.com/news/state-and-regional/bedbug-discovery-on-lawyer-s-clothing-leads-to-closure-of/article_04146c89-d71e-5939-9ced-10709da2853c.html

MASSIVE BED BUG INFESTATION!

There are many sad tales associated with bed bugs. Typically they involve people on low incomes who are unable to pay the high cost of eradication and so the infestation can go on for years. The infestation can increase to alarming proportions to the point that there are so many bed bugs, the blood loss from the bites can affect the health of the resident. One such example that appeared on the internet is of an ex Vietnam vet from Ohio, USA. Gary Meutzel, the bed bug sufferer, has been battling these insects for years. A video on line (which is largely an advertorial) shows his couch being turned over revealing thousands of bed bugs (see link below). Ultimately heat was used to rid his home and belongings of the infestation (SLD: heat requires a high degree of expertise; you need to ensure that heat flows into all areas, be cognisant of proper preparation, such as covering sprinklers, and understand thermodynamics such as heat sinks, to ensure treatment failure does not occur. Heat treatment requires a big upfront investment, with some machines costing over USD\$100,000).

Source: *Cleveland.com* (5/Feb/2019), www.cleveland.com/metro/2019/02/bed-bug-barbecue-company-helps-vietnam-veteran-in-parma-battling-infestation-and-months-of-isolation.html

INDONESIA: DISTURBING IMAGES OF MOSQUITO CONTROL

Disturbing images of workers applying insecticide fogs in Jakarta have appeared on line. Members of the public are standing around shrouded in the insecticide fog, while the applicator of the equipment fails to wear proper respiratory masks. The image of a scarf around the face is totally inadequate and would provide little protection against gaseous vapours (SLD: in the application of insecticides, professional pest managers have responsibility to protect the public and themselves).

Source: *Xinhuanet* (4/Feb/2019), www.xinhuanet.com/english/2019-02/04/c_137799179.htm

INDIA: COCKROACH IN AIR INDIA MEAL

Air India apologies after a passenger is served a cockroach in his meal on a Bhopal-Mumbai flight. The passenger found the cockroach in his meal of idli-vada-sambar. He promptly posted to social media an image of the meal where the cockroach could clearly be seen.

Source: *India Today* (4/Feb/2019), www.indiatoday.in/india/story/air-india-apologises-after-passenger-finds-cockroach-in-food-served-during-flight-1448172-2019-02-04

SINGAPORE: AEDES AEGYPTI NUMBERS DOWN BY 80% WITH WOLBACHIA RELEASE

Wolbachia is a naturally occurring intracellular parasite of insects, and is being used to control *Aedes aegypti* mosquitoes, the vector of dengue and Zika viruses. *Wolbachia* infected mosquitoes have been released at a number of locations in Singapore and the drop in *Aedes* populations have been dramatic. At Nee Soon East, an 80% reduction was recorded, while in the Tampines West study site, *Aedes* numbers were cut by a half.

Source: *The Straits Times* (31/Jan/2019), www.straitstimes.com/singapore/aedes-mosquito-population-down-80-per-cent-in-nee-soon-east-cluster

SINGAPORE: CLAIMS THAT SNAKE WAS MISHANDLED BY PEST CONTROL COMPANY

Claims were made by the Agri-Food and Veterinary Authority of Singapore, that a snake was mishandled during its capture outside Tang Plaza. However the company, Anticimex, deny this allegation. The snake, a large python, was caught in a very crowded part of the city and the company was attempting to protect the general public. In the process, one of the technician placed their foot on the snake to immobilise the reptile and was bitten. It was this incidence that has spread around social media. The technician had surgery to remove an embedded snake tooth.

Source: *Channel NewsAsia* (31/Jan/2019), www.channelnewsasia.com/news/singapore/snake-python-tang-plaza-pest-control-anticimex-responds-to-

[ava-11189478](#)

INDIA: MAYOR PROMISES TO RID THE CITY OF MOSQUITOES

The Mayor of Nellore in India (close to Chennai) has promised to provide garbage bins to clean up the city. Rubbish collects rainwater, which in turn provides habitat for mosquitoes such as *Aedes aegypti*, which is the main vector for dengue virus (SLD: as anyone who has been to India would know, sanitation is a major issue and rubbish collection is hugely problematic. The mayor should be congratulated for creating this initiative. However it is imperative that all bins are routinely emptied and do not become a mosquito breeding source).

Source: *The Hans India* (31/Jan/2019); www.thehansindia.com/posts/index/Andhra-Pradesh/2019-01-31/Mayor-promises-residents-mosquito-free-city/485260

AUSTRALIA: HUGE RAT IN POPULAR SYDNEY WESTFIELD RESTAURANT

Video has emerged of a rat running around one of the most popular restaurants on Sydney's iconic Westfield. Din Tai Fung is a Taiwanese restaurant that specialises in dumpling and is a huge hit with the locals, with long daily queues. The restaurant expressed apologies and assured diners that the venue will be cleaned and pest control services employed (SLD: there are many restaurants on this floor and I have eaten at many, thus it was unfortunate for the particular group involved. This incidence highlights the power of social media and the dangers of poor pest management.)

Source: *10 Daily* (31/Jan/2019); <https://tendaily.com.au/news/australia/a190131oar/watch-huge-rat-runs-inside-popular-westfield-restaurant-20190131>

ESA POSITION STATEMENT ON CLIMATE CHANGE

The largest insect related society in the world, the Entomological Society of America (ESA), has just released a position statement on the effects of climate change on insect life, and the consequences to humans. Beyond damage to the ecosystem such as biodiversity loss and altered food webs, the ESA suggest that climate change will impact humans through; decreased pollination, reduced food security, increased agricultural and pest outbreaks, increased spread of disease carrying insects, loss of natural resources, and more invasive species. The position paper provides examples of recent changes in the status of some serious pests, whereby some are going through more generation cycles, while others are increasing their distribution. The ESA is encouraging politicians to be more proactive in matters relating to climate change (SLD: is it time for FAOPMA to develop a position statement?)

Source: *ESA* (31/Jan/2019), www.entsoc.org/sites/default/files/files/Science-Policy/2019/ESA-Position-Statement-Climate-Change.pdf

MOSQUITO REPELLENT MARKET TO HIT USD \$5BILLION BY 2022

According to a new report by Zion Marketing, the global

mosquito repellent market is predicted to reach USD\$5 billion by 2022. The report profiled the major suppliers of repellents, and provides current and forecasted demands for repellents from major regions across the globe (SLD: perhaps it was to be expected that global sales in repellents will continue to increase; dengue infections continue to climb and invasive species are spreading globally.)

Source: *Europe Industry News* (28/Jan/2019); <http://europeindustrynews.com/10238/mosquito-repellent-market-globally-reach-usd-5-00-billion-in-2022/>

JAPAN: MAYBE A BIT TOO WEIRD; DATING A COCKROACH

A Japanese man who has a fondness for eating insects, dated a cockroach for a year. He even fantasized about having sex with Lisa (the name of his buggy girlfriend). Sadly their relationship only lasted for a year, as poor Lisa passed away (cockroaches do not live very long). To celebrate her passing, the man ate Lisa! (SLD: if you really wish to hear more about this heart wrenching tale, click on the link below and watch a video of the story.)

Source: *SocialNewsDaily* (28/Jan/2019), <https://socialnewsdaily.com/82711/japanese-man-dated-a-cockroach/>

HEADHUNTING ANTS

In a very macabre behaviour, an ant species found in Florida, *Formica archboldi*, decorates its nest with the severed heads of a much larger ant species. Scientists have wondered for some time, how a much smaller ant can sneak up on its larger and more aggressive cousin to be able to kill it, before the decapitation process. Apparently, *Formica archboldi* is coated in chemicals similar to its larger adversary and so can sneak up to it unnoticed. It then sprays the larger ant with concentrated formic acid and the dying ant is then dragged away before being chopped into pieces.

Source: *BBC Focus Magazine* (28/Jan/2019), <https://www.sciencefocus.com/news/mystery-of-headhunting-ants-solved/>

GALAPAGOS ISLANDS: USING DRONES TO FIGHT RATS

Unmanned aerial vehicles (UAVs), more commonly known as 'drones', are increasingly being used for pest control. They can be used to treat large areas, especially those that are not very accessible via foot. Furthermore they are much cheaper than aerial applications involving helicopters or fixed-winged aircraft. In areas of endangered wildlife, drones are also less of a disturbance than larger aircraft. The Galapagos Islands is one of the most famous areas of the globe for their unique wildlife, however rats are causing major damage to the ecosystems of several of the islands. On one of the small islands in the cluster of the Galapagos, Seymour Norte, conservationists were able to eradicate rats from this island in 2007. However, the rodents have returned, probably swimming from a nearby land mass. Now drones have been employed to drop rodenticides bombs

right across the island. The drones are being flown autonomously (i.e. pre-programmed) to precisely deliver the product at predetermined locations.

Source: *Wired* (25/Jan/2019), www.wired.com/story/drones-drop-poison-bombs-to-fight-one-islands-rat-invasion/

See also: www.nature.com/articles/d41586-019-00176-z

INDIA: INCREASE IN SCRUB TYPHUS CASES

Health authorities are concerned about an increase in scrub typhus, with sanitation workers most affected. In 2018, there were around 269 cases with two deaths in the state capital of Thiruvananthapuram, within Kerala. Just in the first 18 days of this year, some 58 cases have been confirmed. The increase is blamed on a rise in rodent populations, which are the hosts of the mites, due to a lack of waste management. (SLD: scrub typhus is a rickettsial disease spread via chigger mites to humans. The mites acquire the bacteria from rodents, notably certain mice species. Avoiding the bites of the mite is the main means of preventing the disease. The use of personal repellents and the wearing of impregnated permethrin-treated clothing is advisable in high risk areas.)

Source: *ProMED Digest* (23/Jan/2019), Vol. 78(49).

THE PERFECT VALENTINE GIFT; NAME A COCKROACH AFTER YOUR BELOVED!

The Bronx Zoo in New York has a very unique Valentines present; you can name a Madagascar hissing cockroach after your sweetheart and send them a digital certificate of the naming. At only \$15 you will be both economical and romantic!

Source: *NH1* (23/Jan/2019), <https://nh1.com/nh1/the-bronx-zoo-will-let-you-name-a-cockroach-for-your-valentines-day-sweetheart/>

JUST NOT CRICKET, BUT BED BUGS INSTEAD!

English cricketer and fast bowler, Stuart Broad, claimed to be 'getting eaten alive' by bed bugs, while in Barbados on a tour against the West Indies. Other English players were also affected and many slept on mattresses in corridors to avoid bites in the rooms. According to the report, Broad reacted quite badly to the bites, which included in a very 'sensitive area' (SLD: we now know how to defeat the Brits in the next Ashes series!)

Source: *The Sun* (23/Jan/2019), www.thesun.co.uk/sport/cricket/8266534/stuart-broad-bed-bugs-england-west-indies-first-test/

AUSTRALIA: LACK OF FUNDING THREATENING WORLD HERITAGE RAINFOREST FROM YELLOW CRAZY ANT

The Yellow Crazy Ant is considered one of the most invasive species on the planet and can cause tremendous damage to native fauna (see report on the Christmas Island red crab below). The pest ant has invaded the wet tropics of northern Australia, which is a World Heritage Region. Unfortunately, funding to control the ant is due to run out, and government has yet to confirm if the control

program will continue. The funding amount required (AUD\$6million per year for seven years) seems trivial compared to the affects this ant could have on the region (SLD: we can only hope that politicians see sense and urgently fund this program).

Source: *The Guardian* (22/Jan/2019), www.theguardian.com/environment/2019/jan/22/yellow-crazy-ants-world-heritage-area-at-risk-through-lack-of-funding

AUSTRALIA: RATS IN FAMOUS FAST FOOD TAKEAWAY

Fast food shop Oporto has been forced to close its Broadway store in Sydney after videos were posted on Facebook showing rats running around its premise. Rats were filmed jumping onto counters and kitchen equipment. According to the owner of the company, the store was immediately closed, pest control measures implemented, and the store undergone intensive cleaning. The presence of the rats were blamed on nearby construction works (SLD: construction work is well known to disturb and displace rodent populations, especially in Sydney. Pest management companies should advice their clients to undertake increased rodent monitoring and control, when construction is undertaken nearby.)

Source: *ABC News* (22/Jan/2019), www.abc.net.au/news/2019-01-21/oporto-rat-infestation-video-forces-sydney-store-to-shut/10733304

BANGLADESH: GROWING MOSQUITO PROBLEM IN DHAKA

The mosquito problem is continuing to grow in the city of Dhaka and reports claim that while government authorities undertake adulticiding with fogs, they never attempt to solve the problem through source reduction of larval habitats. However, senior government officials claims a different view and claims they have been highly proactive, undertaking property inspections and fining people with serious mosquito problems. In 2018, almost 6,500 people were infected with the dengue virus with some 24 deaths. The number of cases of dengue have grown over recent years (15,100 cases between 2014 to 2018) and government insiders state that there is no special program to control or monitor mosquitoes.

Source: *The Independent* (22/Jan/2019), www.theindependentbd.com/post/184273

NEW ZEALAND: DEATH BY CHOCOLATE (FOR THE RATS)

In Wellington, New Zealand, chocolate is being trialled as a lure for rats to attract them to traps. This avoids the use of toxic baits which can affect other wildlife. The chocolate does not appeal to birds and so will not enter the traps.

Source: *The Advertiser* (21/Jan/2019), www.adelaidenow.com.au/news/world/nz-rats-face-death-by-chocolate-in-new-trial/video/0f6eb6941e3e682a22735aae21dfbb85

BED BUGS AND COCKROACHES IN SCHOOLS

While the presence of cockroaches is ubiquitous (and

expected) wherever humans occurs, it is rare that bed bugs in schools are reported in the press (even if we in the industry are fully aware of it happening!). A report warns that city schools in Glasgow are riddled with bed bugs. A freedom of information request by journalists found seven complaints of bed bugs, with one primary school having up to five treatments of bed bugs in 2018. Some reporters are claiming that this pest problem can be directly linked with poverty, as families with infestations cannot afford to undertake proper bed bug management (SLD: we know there is clear link between many pest problems and poverty. The whole of society should pay for the control of these insect pests to reduce the overall pest burden they impose.)

Source: *Evening Times* (21/Jan/2019), www.eveningtimes.co.uk/news/17372363.cockroach-and-bedbug-alert-for-glasgow-teachers-city-schools-riddled-with-insects/ and, www.eveningtimes.co.uk/news/17372354.bedbug-and-cockroaches-the-only-solution-is-eradicating-poverty/

AFRICA: WIDOW LOSES LIVE SAVINGS TO TERMITES

A woman in Ghana buried all her money under a heap of firewood in Ghana, Africa. The termites ate the wood and then went onto the delicious wood fibres of her cash. Apparently she did not trust banks after much of her money was taken by a dishonest company.

Source: *GhanaWeb* (21/Jan/2019), www.ghanaweb.com/GhanaHomePage/NewsArchive/Widow-loses-life-savings-to-termites-after-hiding-money-under-firewood-716968

HONG KONG: TERMITES PROTECT FORESTS IN DROUGHT

Scientists from the University of Hong Kong found that termites increase in abundance during droughts. This results in higher rates of plant decomposition as a result of the termite feeding, leading to greater nutrient recycling and higher levels of soil moisture. Thus it appears that termites help buffer the effects of drought.

Source: *Asian Scientist* (21/Jan/2019), www.asianscientist.com/2019/01/in-the-lab/termite-drought-tropical-rainforest/

CHRISTMAS ISLAND: TINY WASP TO FIGHT CRAZY ANTS

Without a question, the most iconic creature on the tiny island of Christmas Island are their renowned red crabs. Made famous by their well-documented annual migration, and there are many videos of cars and bikes swerving around these crustaceans during their yearly exodus. Unfortunately, around 30 years ago yellow crazy ants (*Anoplolepis gracilipes*) formed super colonies on the island and would attack any crab that crossed their path. First the crabs are blinded with acid sprayed from the ant, and then the acid attacks the joints of the crabs, stopping and killing them. More than 40 million crabs have been killed by this pestiferous species of ant. The yellow crazy ants feed on honeydew from scale insects

and a novel approach to controlling the ant has been by the introduction of a parasitic wasp (*Tachardiaephagus somervillei*), which attacks and kills the scale. Where the biocontrol program has been initiated, numbers of the yellow crazy ant has decreased.

Source: *ABC* (16/Jan/2019), www.abc.net.au/news/2019-01-16/wasps-enlisted-to-control-crazy-ants-on-christmas-island/10666868

INDIA: JAPANESE ENCEPHALITIS VIRUS

There is a syndrome called 'Acute Encephalitis Syndrome' (AES), which is characterised by fever and various neurological conditions such as confusion, delirium and coma. A number of viral diseases have been attributed to this including those transmitted by mosquitoes such as dengue and Japanese encephalitis virus (JEV). In a recent study of over 10,000 AES patients, where a diagnosis could be made, around one third could be attributed to JEV, another third to scrub typhus (a disease carried by mites) and five percent to dengue virus. This highlights the role of arthropod vectors in the transmission of deadly diseases that can affect the brain.

Source: *ProMED Digest* (13/Jan/2019), Vol. 79(34).

SRI LANKA: TRYPANOSOMIASIS IN DOGS

A trypanosome is a unicellular parasite that can infect a range of vertebrates. The most famous (or infamous!) of these is *Trypanosoma cruzi*, which can cause Chagas disease in humans (it is thought that Charles Darwin contracted Chagas during the voyage of the Beagle). The parasite is transmitted via a 'triatome' insects, often called 'kissing bugs'. A dog in Sri Lanka (in Balangoda) was recently diagnosed with *Trypanosoma* infection (known as Trypanosomiasis), which is the first record of the occurrence of this disease for the island nation. Members of these parasites are known to occur in the Indian subcontinent and the disease is known as 'Surra', and can infect a variety of vertebrate animals including dogs. More work needs to be undertaken on the Sri Lankan case to confirm the identity of the disease.

Source: *Promed* (13/Jan/2019), Vol. 78(26).

EGG-XACTLY, WELL NO! POSSIBLE NEW METHOD OF MOSQUITO CONTROL

Researchers from the University of Arizona have discovered a protein in mosquitoes that is crucial for the formation of their eggs. This protein is known as 'Eggshell Organizing Protein'. By blocking this protein, the egg shell failed to form properly resulting in the death of the embryo. Perhaps in the future, mosquito populations may be able to be controlled by blocking the gene that develops the egg protein.

Source: *Arizona Public Media* (11/Jan/2019), <https://news.azpm.org/p/news-topical-sci/2019/1/11/144184-ua-research-could-help-reduce-disease-spreading-mosquito-populations/>

INDIA: KYASANUR FOREST DISEASE OUTBREAK

There has been an outbreak of Kyasanur Forest disease (KFD) in villages within the Shivamogga district. At least

22 people have been infested with the disease and some four deaths have occurred. (SLD: KFD is transmitted by ticks, which pick up the virus from monkeys. For this reason it is also known as 'monkey fever'. The disease is potentially deadly and can cause haemorrhagic fevers. Prevention is via vaccination and the prevention of ticks bites via the use of personal w, permethrin treated clothing, and habitat treatment.)

Source; *Promed* (6/Jan/2019), Vol. 78(11).

ASIA AND INDIA: CHIKUNGUNYA VIRUS

Thailand: cases during November 2018 increased from 538 to 2,143 in one month.

India: 31 cases of Chikungunya virus were reported in November 2018, from Ahmedabad state.

Source; *Promed* (4/Jan/2019), Vol. 79(7).

AUSTRALIA: MAN ATTEMPTS TO KILL SPIDER AND TRIGGERS MAJOR POLICE RESPONSE

"Why don't you die!" were the words heard by a passer-by, while a baby cried loudly from inside the premise. The call from the panicked hearer of the words prompted a full-scaled police response. Lo and behold, the victim of the murder attempt was a humble household spider! The man responsible for the emergency admitted he suffered from arachnophobia, namely a fear of spiders. He

walked into a room and was confronted with the arachnid villain, which prompted an all-out panic attack. Grabbing a nappy and fought with the eight legged beast, until it resembled a brown smear (I guess that is what is normally in nappies!). Of course the police arrived expecting a murder, which they did find, but not of the two legged variety. The man later admitted that he had never been so embarrassed in his life...

Source: *ABC News* (4/Jan/2019); <https://www.abc.net.au/news/2019-01-03/wa-police-called-out-for-man-trying-to-kill-spider/10683454>

CHINA: STAFF FORCED TO EAT COCKROACHES (UGH!)

Staff who failed to reach sales targets were forced by managers to eat cockroaches and drink urine, according to local media reports. Other staff were publicly humiliated and whipped with belts. The same company also shaved the hair off under performing staff, forced them to drink water from toilets, or drink vinegar. The local police arrested several managers. (SLD: this is one way to curb the ever present cockroach problem!)

Source: *BBC News* (7/Nov/2018), www.bbc.com/news/world-asia-china-46120627 ■



Fancy eating this? Do a goob job and you won't have too! (see above story)

The process of translating an idea or invention into goods or services that creates value or for which customers will pay.



Innovation

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COME HEAR FROM

Robert (Bobby) Corrigan, PhD, Urban Rodentologist, RMC Pest Management Consulting

Bobby has been active in the science of urban pest management for over 25 years. He serves a consultant who specializes in rodent pest management programs on a national and international scale and also as a part time research scientist with The City of New York's Department of Health.

Cor Vink PhD, MSc, Curator Natural History, Canterbury University.

Cor's main research interest is the systematics and taxonomy of New Zealand spiders, but he also worked on spider ecology, biosecurity and biological control. Cor is an Adjunct Senior Lecturer in the Ecology Department at Lincoln University.

Helen Blackie, PhD, MSc, Boffa Miskell, Biosecurity Consultant, Principal Auckland

Prior to joining Boffa Miskell in 2014, Helen was Associate Director at the Centre for Wildlife Management and Conservation (Lincoln University), where she led a nationwide team of experts in engineering, creative design, animal behaviour, toxicology and ecology.

David Lilly, PhD, MEnt, Principal Entomologist, Ecolab Global Pest Elimination – RD&E

David is responsible for developing and supporting innovative pest management solutions for the larger Pest Elimination division. I have 15 years' experience in urban pest management, including both the auditing and/or development of tailored pest management solutions, and providing qualified technical support to high-needs customers.

Registrations Open 1st March 2019 - <https://www.pmanz.nz/2019-conference-and-agm.html>

News from Academia

A compendium of new scientific publications relevant to the pest management industry

Compiled by Stephen L. Doggett and David Lilly

AUSTRALIA: INSECTICIDE RESISTANT MOSQUITOES BROUGHT IN ON AIRCRAFT

Over the last seven years, there has been an increasing number of detections of exotic mosquitoes at Australian sea and air ports. The main species detected has been *Aedes aegypti*, but *Aedes albopictus* and *Aedes japonicus* have also been detected. Australia is currently free of the latter two species and both pose a serious biosecurity risk to the nation. *Aedes aegypti* currently only occurs in Queensland and at present there is no evidence for any insecticide resistance in local strains. Following the exotic detections, researchers from the University of Melbourne undertook genetic analysis of 115 incursive *Aedes aegypti*, both to look for the potential origins of the mosquitoes and to test to see if they may be carrying genes for insecticide resistance. Most of the mosquitoes originated via flights from Bali in Indonesia and most possessed point mutations that confer knockdown resistance. In order to prevent the establishment of these mosquitoes through ports, which could act as a gateway for these exotic species, protocols must consider insecticide resistance.

Source: *Evolutionary Applications* (6/Mar/2019), <https://onlinelibrary.wiley.com/doi/full/10.1111/eva.12787>

IRAN: INSECTICIDE RESISTANCE IN THE COMMON BED BUG, *CIMEX LECTULARIUS*

Whenever bed bugs have been tested, with either the common or tropical species (*Cimex hemipterus*), levels of insecticide resistance have been reported to be very high. In the latest of such research, the common bed bug was tested for resistance to λ -cyhalothrin, malathion, and diazinon in northeastern Iran. Malathion at the highest concentration produced no control, and high levels of resistance were found to

the two other actives. Thus the three insecticides were found ineffective for the control of bed bugs in the region.

Source: *Journal of Medical Entomology* (1/Mar/2019), <https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjz011/5367286?redirectedFrom=fulltext>

INDIA: SENSITIVITY TO MITES IN ALLERGIC INDIVIDUALS

House dust mites are known to be the cause of allergic rhinitis. In a study undertaken in Kolkata, India, patients with allergic rhinitis were tested for sensitivity to dust and stored product mites. Of the 330 patients tested, 92% were sensitive to house dust mites, and rates of sensitization to other mites were also high with many as 88% reacting to certain species of stored product mites. This research may indicate routes of better management of the patient's conditions to the future.

Source: *Journal of Medical Entomology* (25/Feb/2019), <https://academic.oup.com/jme/article-abstract/56/2/347/5193814?redirectedFrom=fulltext>

MALAYSIA: RICKETTSIA FROM TICKS

Infections with *Rickettsia*, a primitive type of bacteria, is common in Malaysian communities living adjacent to forested areas. A research group tested for the presence of *Rickettsia* in ticks at the forest reserve of Kuala Lompat in Pahang. Using molecular tests, *Rickettsia* were detected in one third of the ticks tested, with multiple species of *Rickettsia* being detected. The research shows how the local community is at high risk from these potential pathogens (SLD: many species of ticks, and mites, transmit *Rickettsia* to humans. Some of these can produce high fatality rates, up to 30% in untreated patients. Fortunately, *Rickettsia* infections can be readily eliminated with antibiotic therapy).

Source: *Journal of Medical Entomology* (25/Feb/2019), <https://academic.oup.com/jme/article-abstract/56/2/547/5124549?redirectedFrom=fulltext>

PAKISTAN: INSECTICIDE RESISTANCE IN MALARIA VECTORS

Anopheles subpictus is a malaria vector through southern parts of Asia and insecticides form the main stay of controlling this species. In order to ensure that the most appropriate chemical is used for the control of this species, collections of the mosquito were made from the Kasur district and they were tested for susceptibility status against DDT, deltamethrin, and permethrin. In no case was 100% control achieved in any of the field strains collected, with mortality ranging between 28-79%. This highlights that significant insecticide resistance is occurring in the region and that a review of the chemical control program is warranted.

Source: *Medical and Veterinary Entomology* (18/Feb/2019), <https://onlinelibrary.wiley.com/doi/10.1111/mve.12367>

IMPROVE YOUR HOUSE FLY CATCHES: SWITCH THE TRAP ON AND OFF

Research on the house fly, *Musca domestica*, suggests that with the use of ultraviolet lights, that intermittent turning on and off the traps, can lead to an increase in trap numbers.

Source: *Journal of Insect Science* (17/Feb/2019), <https://academic.oup.com/jinsectscience/article/19/1/22/5321889>

THAILAND: INSECTICIDE RESISTANCE IN THE STABLE FLY.

With the anecdotal evidence for treatment failures with the use of pyrethroids against the Stable fly, *Stomoxys calcitrans*, a research project was initiated in the US to test for knockdown resistance. Stable flies were collected in the US, France, Costa Rica, and Thailand. For the US fly strains, evidence suggested that there are multiple forms of resistance. For Thailand, a mutation (L1014F) was detected that is known to confer knockdown resistance.

Source: *Journal of Medical Entomology* (15/Feb/2019), <https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjz012/5320708?redirectedFrom=fulltext>

WORLDWIDE DECLINE IN INSECTS

In a recent published scientific paper, it is claimed that over 40% of the world's insects are facing extinction. Large groups of butterflies, wasps, and beetles are most affected. The main reason for the decline related to the growing human population that has resulted in widespread habitat destruction, with conversion of forests to intensive agriculture. The decline has been accelerated by the use of agro-chemicals, invasive species, and climate change (SLD: it is a sad world that we are leaving for future generations....)

Source: *Biological Conservation* (12/Feb/2019), www.sciencedirect.com/science/article/abs/pii/S0006320718313636#!

SHHHHHH! THOSE MOSQUITOES ARE LISTENING!

New research has shown that the dengue mosquito, *Aedes aegypti*, can hear over much greater distances than previously thought. Experiments found that they can hear up to a distance of 10m away. While it is thought that this hearing is related to mating behaviours, it is possible they may be hearing humans as well. However, whether sound is also used to find humans as a blood source requires further investigation.

Source: *Current Biology* (7/Feb/2019), [www.cell.com/current-biology/fulltext/S0960-9822\(19\)30028-4](http://www.cell.com/current-biology/fulltext/S0960-9822(19)30028-4)

MONITORING OF THE RED FLOUR BEETLE USING PHEROMONE TRAPS

Researchers from the US have undertaken a monitoring program for the Red Flour Beetle, *Tribolium castaneum*, in rice mills and rice processing facilities. They employed a series of pheromone-baited traps in order to determine the areas of the mill that were most susceptible to the beetle. It was found that the beetle was more commonly collected in processing areas, with fewer numbers trapped in rough rice storage areas. Such information can help guide pest management processes.

Source: *Journal of Economic Entomology* (4/Feb/2019), <https://academic.oup.com/jee/advance-article-abstract/doi/10.1093/jee/toy422/5306467?redirectedFrom=fulltext>

CHINA: WESTWORLD, SCIENCE FICTION, OR HOPE FOR THE DISABLED? CYBORG RATS!

In a paper reminiscent of Westworld, researchers in China have successfully used human thoughts to control the movements of a rat implanted with a device attached to its brain. The rat 'cyborg' was able to be navigated through a complex maze from the thoughts of the researcher (SLD: while this appears to be part science fiction, perhaps this research paves the way for people who suffer severe spinal injuries)

Source: *Scientific Reports* (4/Feb/2019), www.nature.com/articles/s41598-018-36885-0

CHINA: INSECTICIDE RESISTANCE IN THE MALARIA VECTOR, ANOPHELES SINENSIS

Malaria has been on the decline in many countries, mainly due to effective vector management programs. In China, one of the main vectors of malaria (*Plasmodium vivax*) is *Anopheles sinensis*. In spite of ongoing control programs that rely on insecticides, little work has been undertaken examining resistance in this mosquito species. In testing strains of *Anopheles sinensis* from the port city of Wenzhou in Zhejiang province, it was found that field mosquitoes poses a range of resistance mechanisms, including knockdown and metabolic resistance. Such insecticide resistance

could lead to treatment failures and a rise in malaria cases.

Source: *Journal of Medical Entomology* (1/Feb/2019), <https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjz001/5305038?redirectedFrom=fulltext>

INSECT (BUG) BOMBS, INEFFECTIVE AT CONTROLLING COCKROACHES

This will come to no surprise for those us in pest management, however a new study has shown that total release aerosols (insect or 'bug' bombs) have little effect on controlling the German cockroach, *Blattella germanica*. In a study conducted in the USA, researchers compared the effectiveness of insect bombs with gel baits. Cockroach counts were undertaken four weeks after the treatments and it was found that the insect bombs failed to cause a decline in cockroach numbers. The bombs also resulted in significant insecticide residues throughout the kitchen (SLD: hardly any surprise here with this study. We have known for a long time that the aerosols from insect bombs do not penetrate into insect harbourage areas.)

Source: BMC Public Health (28/Jan/2019), <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-018-6371-z>

MALAYSIA: FEEDING MOSQUITOES APHRODISIACS TO MAKE THEM HORNY

One method of insect control involves the use of sterile males. With many insects, they only mate the one time, and thus if the male is sterile, no young will develop. Sterilisation of the males is normally achieved with gamma radiation. The challenge is to encourage the sterilised males to mate and even outcompete the non-sterilised males to find a female. A team of researchers from Malaysia, Japan, and Thailand, found that feeding male *Aedes aegypti* a herbal compound, they mated much more quickly and more often than mosquitoes not feed on the herbal compound. This research could prove promising in the use of sterile insects for population reduction programs (SLD: whoever thought that there would be Viagra for mosquitoes?)

Source: *Indian Journal of Medicine* (25/Jan/2019); <http://www.ijmr.org.in/article.asp?issn=0971-5916;year=2018;volume=148;issue=3;page=334;epage=340;aulast=Dieng>

SMELLS TO CONTROL MICE

The house mouse, *Mus musculus*, is a cosmopolitan pest that can seriously damage stored foods. Current control methods rely on the use of anticoagulant baits, however some mice are able to resist these chemicals. A group of researchers from Argentina looked at the effects of a range of odours to reduce reproductive success in the laboratory. They use a range of smells, including cat urine, smells from unfamiliar male mice, and other chemicals. One chemical,

2,5-dihydro-2,4,5-trimethylthiazoline, not only reduced the number of mice born, but also reduced survival. To date this research has yet to be undertaken in the field.

Source: *Pest Management Science* (24/Jan/2019); <https://onlinelibrary.wiley.com/doi/10.1002/ps.5359>

NEW MOSQUITO REPELLENTS FROM BACTERIA

A chemical compound called 'fabclavines' has been isolated from bacteria has been found to deter biting in three well known mosquito vectors; *Aedes aegypti*, *Anopheles gambiae*, and *Culex pipiens*. Perhaps most impressively, is that very low doses of this chemical were as equally effective at repelling the mosquitoes as DEET and picaridin, the actives in most repellents on the market today. It is still yet to be determined if the bacteria derived chemical will be suitable for use on humans, but the finding opens the possibility of new repellents against insects that carry disease causing pathogens.

Source: *Sci News* (21/Jan/2019); www.sci-news.com/biology/mosquito-repelling-compounds-xenorhabdus-budapestensis-06830.html

PAKISTAN: FIRST DETECTION OF WEST NILE VIRUS

An investigation was undertaken to determine if the mosquito-borne virus, West Nile, is present in Pakistan. The research was undertaken by trapping and testing mosquitoes, and over 1,000 serum samples were collected from blood donors. None of the mosquitoes tested positive, however three of the blood donors were positive for the virus. This was the first detection of West Nile virus in Pakistan, which was from the Punjab Province. The researchers are now calling for authorities to undertake urgent coordinated surveillance to determine the extent of this virus and if humans are impacted (SLD: West Nile virus is one of the encephalitic viruses, which can cause death or permanent brain damage.)

Source: *International Journal of Infectious Diseases* (18/Jan/2019), www.sciencedirect.com/science/article/pii/S1201971219300311#!

CHINA: SPECIAL ISSUE ON PATHOGENS IN CHINA

The US based journal, *Vector-Borne and Zoonotic Diseases*, has just released a special issue focusing on pathogens in China including many papers on vector-borne diseases. Papers include:

- A serosurvey of sheep for the tick-borne infections (notably the bacteria that causes Lyme disease, *Borrelia burgdorferi*),
- A review of an outbreak of Japanese encephalitis virus from 2013 (a mosquito-borne virus),
- The change in the genotypes of Japanese encephalitis virus over 1935-2017,
- Detection of West Nile virus in patients (a mosquito-borne virus),
- The isolation of other mosquito carried viruses such as Akabane (which affects livestock).

Source: *VBZD* (18/Jan/2019); www.liebertpub.com/toc/vbz/19/1

BODY PAINTING PROTECTS AGAINST BLOOD SUCKING INSECTS

Many indigenous tribes undertake body painting, largely for tribal rituals, with the use of brightly coloured stripes on the skin. A group of researchers have tested to see if the stripes may deter the bites of horseflies as it is known that the flies are deterred by the stripes on Zebras. It was found that a model without stripes was 10 times more attractive to horseflies than a model with the stripes. The wearing of such stripes this has the potential to reduce irritation from the insects bite and decrease the risk of a vector-borne pathogen.

Source: *The Royal Society* (16/Jan/2019): <https://royal-societypublishing.org/doi/10.1098/rsos.181325>

CHINA: REGULAR GROOMING PROTECTS TERMITE HEALTH

Researchers in China found that when the subterranean termite *Reticulitermes chinensis* was sprayed with deadly fungal spores, the insects quickly groomed themselves in order to remove the spores. This is clear evidence that grooming behaviour helps mitigate the effects of deadly pathogens.

Source: *Journal of Insect Science* (16/Jan/2019); <https://academic.oup.com/jinsectscience/article/19/1/6/5289805>

LAOS: BIOLOGICAL CONTROL OF RATS USING PARASITES

Rodent control offers many challenges, one of which is trying to prevent non-target animals from eating the baits used in control programs, and succumbing to the poison. One means to overcome this is via the use of biocontrol agents, which only affect the targeted species. *Sarcocystis singaporensis* is a rodent parasite that has been used within baits for the control of a range of *Rattus* species. In a control program in a World Heritage Region of northern Laos, baits containing lethal amounts of *Sarcocystis singaporensis* were able to achieve a significant reduction in rodent populations even up to 83%.

Source: *Pest Management Science* (13/Jan/2019), <https://onlinelibrary.wiley.com/doi/10.1002/ps.5335>

CHINA: MISUSE OF PESTICIDES IN CROP PRODUCTION

Investigations in the agricultural use of insecticides have found serious concerns in how they are employed. Misuse of insecticides was found to be widespread, especially in the production of rice, apple, tea, and vegetables. Some farmers were even unaware of which pests they were controlling or what insecticides they were using (SLD: the overuse and misuse of insecticides is a major problem. Food can be soiled with chemicals, and some such as the organophosphates, can cause cognitive impairment in the developing embryo. Overuse will more likely lead to the rapid development of insecticide resistance. Nobody should be applying insecticides without being properly

trained in the safe use and proper handling.)

Source: *Pest Management Science* (10/Jan/2019), <https://onlinelibrary.wiley.com/doi/10.1002/ps.5332>

ENCAPSULATION INCREASES TOXICITY TO NON-TARGET IMPACTS

These days, insecticides are often encapsulated with some form of protective coating made of a plastic compound or a starch. The encapsulation can ensure that the insecticide is slowly released over time, therefore increasing the residual effectiveness of the product. However, a recent study published in the journal *Nanomaterials* found that encapsulation increases the toxicity of the product to non-target organisms. Researchers from Oregon State University exposed an encapsulated form of cyhalothrin to *Daphnia*, a small invertebrate commonly known as 'water fleas'. They sorted the product into two encapsulation sizes, some were micron-sized and some nanometer-sized. The latter were found to be much more toxic for the water fleas. The researcher state that toxicity studies are rarely performed on the final formulated product, and it is important that such studies are undertaken in order to protect the environment.

Source: *Nanomaterials* (9/Jan/2019), <https://www.mdpi.com/2079-4991/9/1/81>

PATHOGENS CARRIED BY RATS IN EUROPE

Both black and Norway rats are known as carriers of a variety of pathogens that can cause disease in humans (which is one reason we try to control them). To investigate the range of pathogens they carry, a study was undertaken in Europe, where wild rats were captured and tested for a range of microbes. A range of zoonotic pathogens (i.e. those carried by animals) were detected including *Anaplasma phagocytophilum* and several *Bartonella* species. This study highlights the role that rodents play in the transmission of human diseases.

Source: *Pest Management Science* (9/Jan/2019), <https://onlinelibrary.wiley.com/doi/10.1002/ps.5323>

COCKROACH BLOOD TO FEED INSECTS; DELICIOUS!

Maintaining insects in colony can be a real challenge as trying to replicate the exact diet is difficult. One medically important insect is the kissing bug, *Triatoma recurva*, which has the potential to transmit *Trypanosoma cruzi*, the parasite that causes Chagas disease. Juvenile *T. recurva* were fed on a diet of cockroach blood and were able to develop from the first instar to the next. This suggests that the kissing bug can survive in the wild by attacking cockroaches and that to control *T. recurva* in the field, it will also be necessary to manage cockroach populations.

Source: *Journal of Medical Entomology* (31/Dec/2018); <https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjy233/5267884?redirectedFrom=fulltext> ■

Events Calendar

Upcoming pest management events from across the globe

Is yours missing? Send details to Stephen Doggett or David Lilly!

Singapore Pest Management Association, Pest Forum

24-25 April 2019

Orchid Country Club

Singapore

contactus@spma.org.sg

Chinese Pest Control Association Annual Conference

April 2019

Nanchang, China

Educon 2019 (Rapid Solutions)

8-11 August 2019

RACV Royal Pines

Gold Coast, Qld, Australia

www.rapidsolutions.com.au/our-story/our-conference

PMANZ 2019 Biennial Conference and AGM

22-23 August 2019

Waipuna Hotel and Conference Centre
Auckland, New Zealand

www.pmanz.nz/2019-conference-and-agm.html

FAOPMA-Pest Summit 2019

24-27 September 2019

Daejeon Convention Center
Daejeon, Korea

www.faopma2019korea.org

PestWorld (NPMA)

15-18 October 2019

San Diego, California

www.pestworld2019.org

Name This Pest!

Worked out what this is from the last issue? Find out on the next page!



Stephen L. Doggett

Hint: this is around 10mm in length, occurs in wet areas, causes a lot of worry (but has no medical significance), and is one of the most common species submitted to Medical Entomology laboratories.

Moth Flies

Also known as 'Drain Flies' and 'Sewer Gnats'

Text by Marilyn J. Geary, Images by Stephen L. Doggett



ADULT FLIES

Moth flies are from the family Psychodidae. At first glance, a moth fly has a very shaggy appearance. However, their entire squat body and pair of broad pointed wings are densely coated with scale-like hairs, and is superficially similar to a small moth, hence the common term "moth fly". Moth flies stand on six short legs and measure 2-4mm in length and their overall colour is dark grey. They walk in an irregular fashion and are considered weak flyers. When disturbed, they do not disperse very far but tend to stay in the vicinity of their favoured habitat of pipes and drains.

IMMATURE STAGES

A female moth fly can deposit an egg mass that may contain between 10-200 eggs. The larvae hatch within two days and grow through four stages of development over a 1-2 week period. Newly hatched legless larvae are aquatic and swim with a sinuous body motion. Each larva has a defined head capsule that does not retract and a cylindrical body that is evenly marked with dark distinctive bands. Larvae are equipped at the tip of the abdomen with a tapered pigmented tube (the siphon) through which they breathe. The siphon is also fringed at the tip with fine pale hairs. The final stage larvae is up to around 1cm. Air exchange for the pupal stage, which lasts from 1-2 days, is through two small trumpets on the apex of the head.

DISTRIBUTION

Moth flies are common worldwide and an ever present urban insect pest.

HABITAT

Adult moth flies can be observed resting on the walls of rooms that offer cool, humid environments such as bathrooms, toilets, and laundries. These rooms

provide numerous attractive habitats within the associated pipework for egg laying and feeding. The organically rich stagnant water bodies that lie in drains, toilet bowls, shower recesses, and sewerage infrastructure, are highly attractive to female moth flies. The interior of the pipework is coated with gelatinous slime that supports a vast complex of microorganisms on which the developing moth fly larvae feed.

BIOLOGY

Maturing larvae possess strong mouthparts enabling them to feed continuously on this hidden biofilm. Although, when suitable food is unavailable, moth fly larvae have been known to be cannibalistic, and can withstand extreme changes to their immediate habitat including lower temperatures and reduced oxygen content. Food for adult moth flies is from a variety of sources and may include sap, nectar, or liquid carbohydrates. Moth flies are most active after night fall and are attracted to lights. The life cycle of 2-4 weeks will always be dependent on prevailing conditions of their habitat.

MEDICAL IMPORTANCE

Adult moth flies do not bite, however their presence can impact on human health in several ways. The inhalation of particulate matter from the fine scales or fragmented body parts of moth flies are a known source of bronchial asthma for some individuals, whilst more commonly, allergic reactions may result. Presence of the larval stage in a toilet bowl can mistakenly convince some individuals, of actual proof of a "worm infestation" leading to much mental anguish. There is literature that has recorded cases of myiasis from this fly, however as it commonly occurs under the rims of toilet, there are doubts on some of these reports. The role of the moth fly is still being investigated as a mechanical vector for the transmission of bacterial pathogens to humans.

TREATMENT & CONTROL

Domestic household control of this pest is directly related to “good housekeeping practices” to reduce built up layers of organic waste in pipes, drains, and toilet bowls. In commercial premises effective control of this pest can be achieved through surveillance and monitoring, prior to employment of the control strategies which may include application of chemicals. ■

Merilyn J. Geary runs the pathology service at the Department of Medical Entomology at Westmead Hospital, Sydney, Australia (and the much loved partner of Stephen Doggett!)

Moth fly, Front View



An adult moth fly, Top View, ~3mm in length.

Name This Pest!

Find out what this is in the next edition

Stephen L. Doggett



Stephen L. Doggett

Hint: while it is obviously a flea, can you name the species? This was once very common and extremely widespread, but in some countries has not been seen for decades.

New Story, New Research, New Product, New Event, New Ideas?

Then why not share all this new stuff with the rest of the World!

Contributions to the FAOPMA Magazine are welcome

AIMS AND SCOPE

The FAOPMA Newsletter is published quarterly and aims to provide highly quality and science based information pertaining to the pest management industry for FAOPMA members.

Submissions must be relevant to the regions covering FAOPMA members (see www.faopma.com for a list of associations and the respective countries they serve). Submissions may include: original articles based on new research; new products; new events; conference reviews; news items; opinion pieces; stories on industry icons; tributes to past colleagues; book reviews; general articles on pests, pest science, or pest management; and articles relevant to new laws, regulations or other legal issues pertaining to the pest management industry. **Advertorials offend and will not be accepted; our members crave real science!**

CONTRIBUTION GUIDELINES

Contributions are to be in Microsoft Word. DO NOT EMBED IMAGES, send as separate files (see below). For conference flyers and announcements, Adobe PDF format is acceptable.

CONTRIBUTION FORMAT

Title (3-10 words): provide a succinct but eye catching title.

Summary: provide a short summary of the submission in no more than 20 words

Authors: list authors by First name, Surname, include middle name/s as initials. Please also include title, affiliation and email if you wish to be contacted. The affiliations will appear at the end of the formatted submission.

Body of text: 600-1,500 words. Please include subheadings. Large articles may be considered at the discretion of the Editors.

Tables: if possible, avoid using tables.

References: no more than 10.

Images and Figures: (as noted above, do not embed in Word

files). Images are to be full colour and jpg format. If the file size is more than 5MB, then compress the image (i.e. decrease image quality in a photo editor such as Photoshop). Please send several images, but usage of the images will be dependent on publication space. Include a short caption describing the images/figures.

Copyright: it will be assumed that you own the copyright of the information and images submitted, or have written permissions to use these. **Failure to adhere to international copyright laws is your responsibility.** The Editors will only use your information and images for the submitted article, unless otherwise requested. However, articles may reappear online, in print, or in other media. They may be translated and then reprinted in the respective FAOPMA member newsletters.

Acknowledgments: include any potential conflict of interests and sources of funding (if relevant). If acknowledging colleagues, include their full name, position, company or employer, city and country.

Language: English. Write in plain language and avoid complex scientific terms. Avoid dot points and use correct grammar (send to a professional editing service if in doubt).

Galley Proofs: for articles and larger manuscripts (of more than one page) a galley proof of the typeset article will be sent to authors for review. Please annotate the PDF and return to the editors within 48 hours. A nil response will be seen as acceptance of the manuscript.

Review: if the Editors are in doubt about the quality of a submission, then the manuscript may be sent for external peer review. Such reviewers will remain anonymous to the authors.

Access and Sharing: authors are permitted to make their paper available on any platform, such as ResearchGate.

Submissions will be published at the discretion of the Editors.

Editorial email contacts are listed on Page 63. ■

FAOPMA Executive Committee

The leaders behind the Association



Ms. Huang Xiao Yun (President)
Chinese Pest Control Association (CPCA)

Ms. Huang is a trained medical Dr. and served as a director of public health in the Ministry of Transportation from 1983 to 1993. She is the founder of the Chinese Pest Control Association. She currently serves as the President of FAOPMA and the CEO of the Chinese pest control association. She is also the original proponent of "World Pest Day".

Mr. Suchart Leelayouthyotin (Vice President)
Thailand Pest Management Association (TPMA)

ExCom of Pacific Rim Termite Research Group (PR-TRG).
Chief Advisor of Thailand Pest Management Association (TPMA).
Regular Speaker of Thai-FDA Pest control Licensing Course.
Chairman and Founder of King Service Center, since 1977.



Dr. Raymond Lee (Honorary Secretary)
The Pest Control Association of Malaysia (PCAM)

Dr Lee has been involved in the Pest management Industry since 1986 and is the founder of PEST DYNAMICS (M) SDN BHD, Malaysia. His involvement in the Malaysian Pest Control Industry also includes being the founder member and Protem COMMITTEE (1993/94) . He has been an Executive Committee member of FAOPMA since 2013 and currently, serves as Honorary Secretary of FAOPMA.

Mr. Junichiro Katayama (Vice Treasurer)
Japan Pest Control Association (JPCA)

Junichiro was born in 1965 in Osaka. He has been involved in FAOPMA since 2001 and served as President over 2007-2009. He has been president of Semco since 2000 which is the largest distributor for the professional pest management industry in Japan and an exporter of the WHO certified residual sprayers. Junichiro loves sports such as water polo, full marathon, and recently competed in triathlon!




Mr. Vasili Tsoutouras (President Elect)

Australian Environmental Pest Managers Association Ltd. (AEPMA)

Vasili Tsoutouras is the CEO of Allstate Pest Control, a family-owned and operated business. He has a great passion for the business and the pest management industry that has led him to be appointed to the position of South Australian Director of the AEPMA and he also sits as the President of the National Board, President Elect of the FAOPMA and President of the Global Pest Management Coalition.

Mr. Won Soo Hong (1st Reserve Member)

Korea Pest Control Association (KPCA)

Mr. Won Soo HONG studied agricultural chemistry at the Konkuk University in Seoul. He is the founder of Pestco Co., Ltd in 1984 and has been the representative until today. In 1999, he became a director of KPCA (Korea Pest Control Association) and from 2015 he has been the President of KPCA. Mr. Won Soo HONG is also the 1st Reserve Member of FAOPMA.


Mrs. Theresa Villegas (2nd Reserve Member)

Pest Exterminators Association of the Philippines (PEAP)

Wife of the late Mr. Villegas Past President of FAOPMA. General Manager of Macodyn, inc with almost 50 years of experience in the Pest Control Business in the Philippines. Distributor of Chemicals and Equipment of the following companies: Jardine Distribution, Syngenta Philippines, Leads Environmental Health.

Miss Catherine Yan (Administrator)

Hong Kong Pest Management Association (HKPMA)

Catherine has been working in the environmental services industry for 34 years and was the President of Hong Kong Pest Management Association during 1989-1990 and 2008-2018. Currently, she is the Honorary President for the Association. Catherine joined FAOPMA as the Administrator in 2011 to run the secretariat office.


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David.Lilly@ecolab.com

Association Presidents

The leaders from the member associations that make up FAOPMA



Mr. Vasili Tsoutouras (Australia)

Australian Environmental Pest Managers Association Ltd. (AEPMA)

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Ms. Huang Xiao Yun (China)

Chinese Pest Control Association (CPCA)

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Mr. Choi Ping Yin (Hong Kong)

Hong Kong Pest Management Association (HKPMA)

Mr. Yin has been working in the pest control services industry for 43 years. He joined the Hong Kong Pest Management Association in 2000, and has been a member of the Executive Committee since 2014. He has taken up various functions such as Chairman of Training Sub-Committee, Honorary Treasurer, and Public Relations Officer. Currently, he is the elected President of HKPMA for the term 2018-2019.

Mr. Jaldhi Rajnikant Trivedi (India)

Indian Pest Control Association (IPCA)

After completing a BSc in 1985, Mr. Trivedi joined his family pest management company, Elite Corporation. He strengthened his knowledge by attending various short courses at several Government of India institutes. In 2012, he was selected as a Master Trainer for Methyl Bromide Fumigation. In 2018, he joined the Global Pest Management Coalition to help attain a safer pest free environment for future generations.





Mr. Boyke Arie Pahlevi (Indonesia)
Indonesia Pest Control Association (ASPPHAMI)

Mr. Pahlevi has been President since 2015, is an active member of the Indonesian Chamber of Commerce, and the founder of Riztra Pest Control. He actively promotes the development of the pest management industry in Indonesia. He was instrumental in establishing 'Pest Academy', an national conference and exhibition first held in 2017. This is a biennial event and will be held again in 2019.

Mr. Kenjiro Yamaguchi (Japan)
Japan Pest Control Association (JPCA)

Mr. Yamaguchi founded Yokohama Sun-Self Co., Ltd. in 1970. He became a member of the board of directors, Kanagawa Prefecture Pest Control Association in 1988, and a member of the board of directors, Japan Pest Control Association in 1998. Mr. Yamaguchi became the chairman of the Japan Pest Control Association in May, 2018.



Mr. Won Soo Hong (Korea)
Korea Pest Control Association (KPCA)

Mr. Won Soo HONG studied agricultural chemistry at the Konkuk University in Seoul. He is the founder of Pestco Co.,Ltd in 1984 and has been the representative until today. In 1999, he became a director of KPCA(Korea Pest Control Association) and from 2015 he has been the President of KPCA. Mr. Won Soo HONG is also the 1st Reserve Member of FAOPMA.

Mr. Nor Hisham Badri (Malaysia)
The Pest Control Association of Malaysia (PCAM)

Mr. Badri studied economics at West Texas A&M State University. He was formerly the Honorary Secretary for PCAM (2013-2015), Vice President (Projects, 2011-2013), and Vice President (Communications, 2001-2003). He was member of the Working Group in developing the National Occupational Skills Standard (NOSS) in 2015. He was also instrumental in the development of Malaysian Standard (MS 1849) on Termite Management in 2005.



Mr. Andrew Chan (Singapore)
Singapore Pest Management Association (SPMA)

Mr. Andrew Chan is the President of Singapore Pest Management Association (SPMA). He has been the President since 2006 and is actively involved in promoting the pest management industry in Singapore and the region, working closely with all the former Pest Summit partners in Indonesia, Malaysia, Philippines and Thailand respectively. He was actively involved and successfully organized five Pest Summit events since 2003.

Prof. Hsiu-Hua Pai (Taiwan)
Taiwan Environmental Pest Management Association (TEPMA)

Prof. Pai is currently engaged in the prevention and control of mosquito-borne diseases and the efficacy test of insecticides against various pests. She hosts a qualified insecticide efficacy testing laboratory certified by the Taiwan Environmental Protection Administration. Regularly Prof. Pai meets with professionals in the environmental pesticide manufacturing, retailer and vector control industries to discuss professional issues and provide expert advice.





Mr. Supanut Kiatyingpracha (Thailand)

Thailand Pest Management Association (TPMA)

Mr. Kiatyingpracha has a MBA in Operation Management and a BSc from Kasetsart University. He is the Director of Thai Sky Clean. Previously, he was the Business Manager for BASF (THAI), and Service Manager, Pest Control Department, Property Care Services Ltd. He was the Chairman of Sponsors and Exhibitors at FAOPMA-Pest Summit 2017 and currently a member of the Thailand Pest Management Association Executive Committee, 2017-2019.

Mr. Danilo L. Magpantay (Philippines)

The United Pest Management Association of the Philippines (TUPMAPHILS)

Mr. Magpantay is an entomologist from the University of the Philippines, and a technical and former branch manager of Rentokil Philippines for over 14 years. Currently he operates his own Bugkil Pest Management business offering extermination and fumigation services. Mr. Magpantay is the President of The United Pest Management Association of the Philippines (TUPMAPHILS) for the ensuing year 2019-2020.



Mr. Nguyen Bao Son (Vietnam)

Viet Nam Association of Fumigation

To be provided.

Mr. Eitan Amichai (Israel – Associate Member)

Eitan Amichai Pest Management IPM Ltd

Founded the company in Israel in 1963, is still active in its management. Israel's largest and leading pest control company. The world's first company that has developed and operates digital pest control in thousands of plants and food businesses in Israel and around the world.

