July 2020

Issue No. 611

This month we announce the inaugural Ted Taylor Student Award offering a prize of $1000 for the best student article on entomological matters, as judged by a panel of distinguished entomologists. The prize is available to any student who submits an article worthy of publication either in the society's journal (General and Applied Entomology) or the newsletter Tarsus. Entries close on 14 August 2020 for the 2020 year. Notice has previously been despatched by email.

This month's member spotlight is Bryce Peters, recently retired from University of Technology. Bryce and his business partner of 35 years, Dr Peter Miller (also retired from UTS) continue to provide consulting services, including laboratory and field trials, to the pest control industry through their newly established laboratory at Kurnell in Sydney.

We continue providing hyperlinks to entomological stories and research that may be of interest to members and some interesting photos of insects.

Kind Regards

Garry Webb

Circular editor

NEWS FROM YOUR COUNCIL

The Ted Taylor Prize

Between April and June, the Society's Council discussed and eventually offered a $1000 prize and publication in G&AE or Tarsus, for short Entomological articles submitted by any Student of Entomology in NSW. The process is being managed by our Vice-President Nigel Andrew via the University of New England. The Link and advertised offer are as follows;

Submission Link: https://bit.ly/NSWES_TedTaylor

Entomological Society of NSW. Ted Taylor Publication Award

The Entomological Society of NSW is offering a prize of $1000 in memory of our long-standing treasurer, Ted Taylor, who died in February 2017. Entries are invited from NSW university students enrolled at any level. Entries must relate to insect biology, be written in a form appropriate for the general public, and be no more than 1500 words in length. A single figure may be submitted as part of the entry and no more than five references may be included. Entries will be judged by a panel of senior entomologists. Appropriate entries may be published in the Society's journal, General & Applied Entomology, or the Society's magazine Tarsus.

Submissions due: 5pm 14th August 2020. (Secretary's note; **due date may be extended**)
Only one submission per person allowed.

If you have any issues with submission, please contact Nigel Andrew (Ent Soc NSW Vice-President) - nigel.andrew@une.edu.au

Members passing this on to any potentially interested party they know would be helpful.

'Zoom' Meetings;

Largely induced by Covid virus restrictions the Society's Council have initiated 'virtual' electronic Council meetings.

An initial trial Zoom meeting was held between three members of Council in April followed by an advertised full Council meeting (attended by six Councillors) in June 2020.

The Zoom meetings were hosted by Nigel Andrew using the UNE's unlimited time access to Zoom.

Meeting electronically significantly helped facilitate the completion of the 'Ted Taylor Prize' process.

In addition, Robin Parsons (Secretary/Treasurer) has also attended/represented Ent Soc NSW via the initial 'Zoom' meetings hosted by the Entomological Society of Queensland (ESQ).

Council will likely consider holding General meetings or Special events via Zoom.

Any members with comments on meeting on-line (for or against) please contact the Secretary/Treasurer or President.

Thank you wishing you all safe and well.

Council

Member Spotlight

Bryce Peters

Early Life: I was born in Narwee, a relatively new suburb in south-west Sydney. I grew up living directly behind the bushland corridor which would much later become the M5 Freeway. This, combined with spending most weekends on the Hawkesbury river at Ebenezer, gave me a keen interest in biology. I spent a lot of time collecting tadpoles and rearing them through to frogs!

Education & Career: I completed the HSC in 1976 and had a gap year in 1977 to allow me to gather some finances together. Unfortunately, the gap year did not involve overseas travel as seems to be the case with many of today's school leavers. In early 1978, I started a degree in Applied Biology at New South Wales Institute of Technology (NSWIT). I very much enjoyed the entomology subjects and the subjects focusing on aquatic biology. I completed this degree in 1980. In early 1981, I started working as a Technical Assistant in the Biological & Chemical Research Institute of the NSW Department of Agriculture at Rydalmere in Sydney. This work was mainly in soil science.

Later in 1981 I was offered a position as a Technical Officer at NSWIT in the School of Life Sciences at Gore Hill. Dr Peter Miller was also working at Gore Hill as a lecturer and was the only entomologist on staff at that time. Peter and I began working on insects together and we developed a friendship which remains to this day. Peter kept colonies of German & American cockroaches and I really enjoyed working with them when I was not preparing practical classes in biology. The School encouraged consulting and contract research and Peter and I soon developed relationships with several insecticide companies. Our early research and consulting work was primarily focused on cockroaches. However, demand increased for work on other insects pests (and spiders) and we gradually increased the range of pests we were able to conduct trials on.

In the mid-80s, NSWIT agreed to take on nurse training and a School of Nursing was established. The nursing course needed several specialized science subjects and Peter and myself established the Bioscience Unit to facilitate this. We moved to newly renovated laboratories on Level 14 of the Tower Building on the city campus. At this stage I was promoted to Senior Technical Officer. We established a purpose-built cockroach breeding room and an insecticide testing laboratory. It was an interesting dilemma breeding cockroaches in the middle of a 28-story inner city building. We had physicists below us and mathematicians and engineers above us. These people had no sense of humour and we were always getting blamed if anyone spotted a cockroach!

Around this time we started working on fleas. Flea products were primarily environmental sprays in those days. It was on fleas & later cockroaches where we first started working on insect growth regulators. On-animal flea products were starting to be developed and we conducted several on-animal field studies in Cairns (Queensland). We also ran many German cockroach field studies in Sydney and American/Australian cockroach field studies in Townsville and Cairns. These were conducted primarily in public housing and I have many stories to tell of our experiences with the tenants!

NSWIT became the University of Technology, Sydney (UTS) on Australia Day in 1988. The Bioscience Unit continued to grow and I was very busy with managing laboratories and staff and conducting insect research. Expansion continued throughout the 90's and early 2000's and the Bioscience Unit turned into the Department of Health Sciences. I was promoted to Technical Manager during this

period. In 2006, the entire Faculty of Science was moved to a newly renovated building on the city campus and a new dedicated Science building soon followed. We were allocated two insect breeding rooms, two insecticide test laboratories and a store room on the top floor of the renovated building. We were located right next to the wet anatomy labs and morgue. It made it a bit spooky working alone late at night! One insecticide test laboratory contained several small WHO test chambers and a larger Peet-Grady chamber. These were used to test various insecticide products against mosquitoes and house flies. The other insecticide test laboratory contained large trays that were used to test cockroach baits and gels.

In 2012 I was promoted to General Manager, Technical Services and looked after all the teaching and research laboratories in the Faculty of Science. I was responsible for up to 60 staff, from laboratory cleaners through to Professional Officers. I remained in this position until I retired from UTS in November 2018. Peter Miller had retired during this period and remained as a Visiting Fellow where we continued our insect work. Following both our retirements, Peter and I wanted to continue working on insects and we established our own laboratory in a factory in Kurnell in southern Sydney where we still work today. I still enjoy working with insects and particularly enjoy field studies that take us to far flung destinations in Australia.

Current Interests: Fleas, cockroaches, personal insect repellents against mosquitoes and bush flies.

Mosquito Field Trial in Cairns and crocodile infested swamp. The exposed leg technique.

New Entomological Research

(**Right Click** on the titles (or **CTRL Right Click**) to see the full articles)

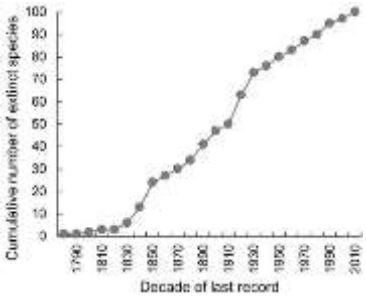
Bushfire crisis spells trouble for Aussie insects

Australia's current bushfire crisis could wipe out some of our rarer insect species, according to a group of experts. Associate Professor Michael Braby from The Australian National University (ANU) says the bushfires will have a huge impact on our native insects, as well as the plants and animals that rely on them. "Insects are critical for a healthy environment," Associate Professor Braby said. "They are food for many other animals, and contribute to processes like pollination, decomposition, nutrient cycling and soil aeration, which is vital because if the flowers of certain plants are not pollinated they can no longer reproduce.

Prescribed burns benefit bees

Freshly burned longleaf pine forests have more than double the total number of bees and bee species than similar forests that have not burned in over 50 years, according to new research from North Carolina State University. For many forests, fire is as essential as rainfall. But while several studies have outlined the benefits of human-controlled prescribed burns on forest ecosystems, little was understood about how prescribed burns, or fires in general, may impact pollinators. "There is global concern about the decline of insects in general, and pollinators in particular, so it's really important for land managers to understand how prescribed fire affects insect communities," says Elsa Youngsteadt, co-author of a paper on the work and an assistant professor in NC State's Department of Applied Ecology.

Scientists re-counted Australia's extinct species, and the result is devastating



It's well established that unsustainable human activity is damaging the health of the planet. The way we use Earth threatens our future and that of many animals and plants. Species extinction is an inevitable end point. It's important that the loss of Australian nature be quantified accurately. To date, putting an exact figure on the number of extinct species has been challenging. But in the most comprehensive assessment of its kind, our research has confirmed that 100 endemic Australian species living in 1788 are now validly listed as extinct. Alarmingly, this tally confirms that the number of extinct Australian species is much higher than previously thought.

El Niño contributes to insect collapse in the Amazon

Hotter and drier El Niño events are having an alarming effect on biodiversity in the Amazon Rainforest and further add to a disturbing global insect collapse, scientists show. A new study focusing on the humble, but ecologically key, dung beetle has revealed for the first time that intense droughts and wildfires during the last El Niño climate phenomenon, combined with human disturbance, led to beetle numbers falling by more than half -- with effects lasting for at least two years. Although the El Niño of 2015-16 captured less attention than the deforestation fires of 2019, it delivered a very significant drought and, in combination with human activities such as agriculture and deforestation, contributed to mega wildfires that burned more than 3 million hectares of Amazon forests, including a million hectares in just one region.

What Jenga can teach us about wildlife conservation before it's too late

Despite considerable effort, and some wonderful success stories, it is widely acknowledged that global conservation targets to reverse declines in biodiversity and halt species extinctions by 2020 will not be met. Significant and rapid declines in insects, birds, mammals, reptiles, amphibians and fish are increasingly being reported from many parts of the world as a result of human activities. Last year, the most thorough assessment of the world's biodiversity to date was published. This estimated that a million animal and plant species are now threatened with extinction. That's 25% of the planet's species, based on the best estimates. I have been playing "Biodiversity Jenga" with university students, school children and members of the public in shopping malls for over a decade. I do this to explain concepts in food web ecology and show how ecosystems become less stable as species go extinct. Each brick has a different picture of a farmland plant, insect, bird or mammal on it and these are stacked to make a tower representing a farm ecosystem. I include human bricks too, who not only make decisions about how the farm is managed, but are also dependent on the ecosystem for their own survival.

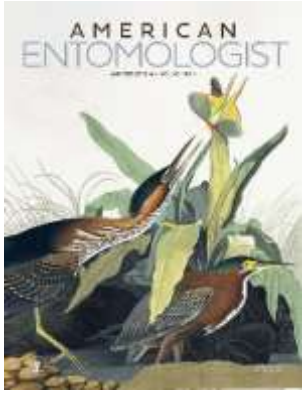
Scientists fear insect populations are shrinking. Here are six ways to help

Are you planning a big garden clean-up this summer, or stocking up on fly spray to keep bugs at bay? Before you do, it’s worth considering the damage you might cause to the insects we share the planet with. Australia’s insect populations are under pressure. The problem is better known in the Northern Hemisphere, where over the past few years scientific studies have reported alarming declines in insect numbers. We don’t yet have a true understanding of what is happening in Australia. This week, scientists gathered in Brisbane at the Australian Entomological Society conference to discuss the extent of the problem.

Scientists warn humanity about worldwide insect decline: They also suggest ways to recognize and avert its consequences ...

Insect declines and extinctions are accelerating in many parts of the world. With this comes the disappearance of irreplaceable services to humans, the consequences of which are unpredictable. A group of scientists from across the globe has united to warn humanity of such dangers. Engaging civil society and policy makers is essential for the future and mutual well-being both of people and insects. In addition to mitigating climate change, an important aspect of the solution involves setting aside high-quality and manageable portions of land for conservation, and transforming global agricultural practices to promote species co-existence. Humanity is pushing many ecosystems beyond recovery. As a consequence, unquantified and unquantifiable insect extinctions are happening every day. Two scientific papers by 30 experts from around the world discuss both the perils and ways to avoid further extinctions, intending to contribute towards a necessary change of attitude for humanity's own sake. "It is surprising how little we know about biodiversity at a global level, when only about 10 to 20 per cent of insect and other invertebrate species have been described and named. And of those with a name, we know little more than a brief morphological description, maybe a part of the genetic code and a single site where it was seen some time ago," says Pedro Cardoso, from the Finnish Museum of Natural History Luomus, University of Helsinki, Finland.

Not-So-Comic Take on Insects Going Extinct



We humans encounter insects almost everywhere. From the annoying mosquitoes, house flies, bed bugs, and cockroaches to the beautiful butterflies and handy honey bees, we see them all—or at least some of them—on a daily basis. So far, so good. But what shook us up were the Nostradamus-like predictions of collapse and the announcement of doomsday for our little co-inhabitants. A thorough scientific review (Sánchez-Bayo and Wyckhuys 2019) and a series of newspaper reports before and after that (e.g., Jarvis 2018, Carrington 2019) sent shock waves through the entomological community. Insects are going extinct! There are innumerable explanations given for their decline. But I have my own slightly...

Lights out? Fireflies face extinction threats of habitat loss, light pollution, pesticides

Habitat loss, pesticide use and, surprisingly, artificial light are the three most serious threats endangering fireflies across the globe, raising the spectre of extinction for certain species and related impacts on biodiversity and ecotourism, according to a Tufts University-led team of biologists associated with the International Union for the Conservation of Nature. Fireflies belong to a widespread and economically important insect group, with more than 2,000 different species spread out across the globe. To better understand what threats are faced by fireflies, the team led by Sara Lewis, professor of biology at Tufts University, surveyed firefly experts around the world to size up the most prominent threats to survivial for their local species. Their perspective piece, published today in *Bioscience*, sounds a warning bell about the insects' future, highlighting specific threats and the vulnerability of different species across geographical regions.

Small Predators Most Likely to Be Lost Due to Human Land-Use According to Global Study

A first of its kind, global study on the impacts of human land-use on different groups of animals has found that predators, especially small invertebrates like spiders and ladybirds, are the most likely to be lost when natural habitats are converted to agricultural land or towns and cities. The findings are published in the British Ecological Society journal *Functional Ecology*. Small ectotherms (cold blooded animals such as invertebrates, reptiles, and amphibians), large endotherms (mammals and birds) and fungivores (animals that eat fungi) were also disproportionally affected, with reductions in abundance of 25-50% compared to natural habitats. The researchers analyzed over one million records of animal abundance at sites ranging from primary forest to intensively managed farmland and cities. The data represented over 25,000 species across 80 countries.

Researchers discover a potential window for managing insects without chemicals

The world's insects are headed down the path of extinction with more than 40 percent of insect species in decline according to the first global scientific review, published in early 2019. Intensive agriculture is the main driver, particularly the heavy use of pesticides. Now, however, SFU biological sciences researchers Adam Blake and Gerhard Gries have made a key discovery that could help to reverse this decline. In a new study, published earlier this month in the *Proceedings of the Royal Society B*, they reveal how insects use polarized light to differentiate which plants to eat or lay eggs on—by looking at how light reflects from their leaves.

[Plant-eating insects disrupt ecosystems and contribute to climate change](#)

A new study from Lund University in Sweden shows that plant-eating insects affect forest ecosystems considerably more than previously thought. Among other things, the insects are a factor in the leaching of nutrients from soil and increased emissions of carbon dioxide. The researchers also establish that the temperature may rise as a result of an increase in the amount of plant-eating insects in some regions. Using extensive meta-analysis, a research team at Lund University has for the first time examined how plant-eating insects affect soil processes in forest ecosystems globally. The study, which is published in *Journal of Ecology*, examines biological and biogeochemical reactions in the soil. When damaged plants, carcasses and secretion substances from insects fall to the ground, the turnover of carbon and nutrients increases. This leads to leaching from the forest floor and the release of more carbon dioxide.

[Learning More About Why We Freeze Up When We're Startled](#)

Researchers have used a common molecular model, the fruit fly, to learn more about why we suddenly freeze when we're startled. This phenomenon has been observed in almost every animal where researchers have looked for it. The startle response was found to be triggered by a chemical messenger called serotonin, which stops our bodies when we perceive a sudden threat. When flies unexpectedly experience a rapid change in their environment, a burst of serotonin is released, stopping their movement. The findings have been reported in Current Biology.

[How fruit flies flock together in orderly clusters](#)

Opposing desires to congregate and maintain some personal space drive fruit flies to form orderly clusters, according to a study published today in *eLife*. Many animals ranging from swarming insects to wildebeests form large, orderly groups. This collective behaviour is often crucial to survival. It may help animals find food, escape predators, enhance the way they sense their surroundings and augment their decision making. But the processes that enable these group gatherings are not well understood. It can be difficult to study large animal groups in the wild, but studying smaller animals in the laboratory can help scientists tease apart the processes that drive animal clustering step by step. For this work, researchers in China looked at what drives clustering in the sociable fruit fly Drosophila melanogaster.

[Invasive species set to exploit climate change in Antarctica](#)

In the tiny part of Antarctica where the snow melts in springtime, mosses, lichens and grasses grow alongside flies, mites and colonies of micro-organisms that have fed and reproduced for millions of years. The rich biodiversity is preserved by an ancient equilibrium of extreme cold and the isolation of a land mass surrounded by powerful ocean currents. But scientists argue in a report published Wednesday that climate change will make it easier for invasive species to establish themselves, even though the continent is warming at a slower pace than other parts of the planet. "Climate change both reduces the barrier to getting in, so it makes it less stressful... and it reduces the problems of establishing," said British Antarctic Survey expert Peter Convey, who co-authored the research published in *Science Advances*.

Feel like you're a mozzie magnet? Mosquitoes really do prefer to bite some people over others

It's always you, isn't it? The person busy swatting away buzzing backyard mosquitoes or nursing an arm full of itchy red lumps after a weekend camping trip. You're not imagining it — mosquitoes really are attracted to some people more than others. Why do mosquitoes need blood? Only female mosquitoes bite. They do it for the nutrition contained in blood, which helps develop their eggs. Mosquitoes don't just get blood from people. They're actually far more likely to get it from biting animals, birds, frogs and reptiles. They even bite earthworms.

"Natural" Oil Mosquito Repellents May Fend Off Mosquitoes—Briefly

Humans have probably sought ways to avoid mosquito bites throughout their existence. And for good reason: the insects are the world's most dangerous animals, feeding on blood and in doing so spreading deadly pathogens like malaria, yellow fever, and others. While chemical repellents containing DEET (N,N-diethyl-m-toluamide) are widely used, known to be effective, and result in few health problems, more people are looking at essential plant oils as a more "natural" and safe way to repel mosquitoes. However, many of these oils have well-documented toxicity, and each oil's capacity as a repellent is unknown.

Some Infected Mosquitoes Found to Be Less Responsive to Repellents

Insect repellents are a $3.6 billion industry globally, and demand for repellents is increasing as the ranges of mosquitoes that vector disease expand in response to climate change. Repellents are crucial to public health because many mosquito-borne diseases are dangerous and pose daunting health burdens to society. Malaria alone causes about 400,000 deaths per year, and dengue sickens an estimated 100 million people and kills more than 20,000 each year. To explore the efficacy of repellents, Associate Professor Marc J. Lajeunesse and students from the University of South Florida conducted a meta-analysis asking: Do infected and non-infected mosquitoes show different responses to insect repellents? To examine this question, they screened 2,316 studies and identified 13 that had data that could be used for analysis.

Genetically engineered mosquitoes are immune to all strains of dengue virus for first time

Locked in a secure lab near Melbourne is the newest addition in the fight against dengue: genetically engineered mosquitoes that are resistant to all strains of the potentially deadly virus. While there have been attempts to genetically engineer mosquitoes to make them resistant to the pathogen in the past, they have been limited to only a couple of the four strains, said study co-author Prasad Paradkar of CSIRO's Australian Animal Health Laboratory. "This the first time we have made a line of mosquito which is resistant to all four dengue types," Dr Paradkar said.

Mosquitoes species are attracted and repelled by light at different times of day

In a new study, researchers found that night- versus day-biting species of mosquitoes are behaviorally attracted and repelled by different colors of light at different times of day. Mosquitoes are among major disease vectors impacting humans and animals around the world and the findings have important implications for using light to control them. The University of California, Irvine School of Medicine-led team studied mosquito species that bite in the daytime (Aedes aegypti, aka the Yellow Fever mosquito) and those that bite at night (Anopheles coluzzi, a member of the Anopheles gambiae family, the major vector for malaria). They found distinct responses to ultraviolet light and other colors of light between the two species. Researchers also found light preference is dependent on the mosquito's sex and species, the time of day and the color of the light.

Mosquitoes are drawn to flowers as much as people -- and now scientists know why

Despite their reputation as blood-suckers, mosquitoes actually spent most of their time drinking nectar from flowers. Scientists have identified the chemical cues in flowers that stimulate mosquitoes' sense of smell and draw them in. Their findings show how cues from flowers can stimulate the mosquito brain as much as a warm-blooded host -- information that could help develop less toxic repellents and better traps. Without their keen sense of smell, mosquitoes wouldn't get very far. They rely on this sense to find a host to bite and spots to lay eggs. And without that sense of smell, mosquitoes could not locate their dominant source of food: nectar from flowers. "Nectar is an important source of food for all mosquitoes," said Jeffrey Riffell, a professor of biology at the University of Washington. "For male mosquitoes, nectar is their only food source, and female mosquitoes feed on nectar for all but a few days of their lives."

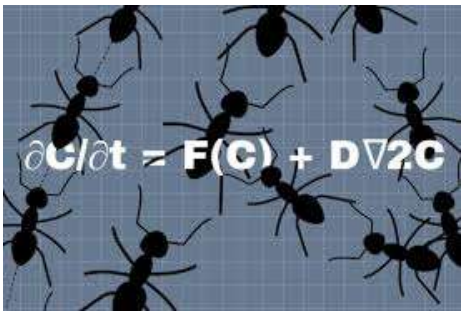
How flowers adapt to their pollinators

Flowering plants are characterized by an astonishing diversity of flowers of different shapes and sizes. This diversity has arisen in adaptation to selection imposed by different pollinators including, among others, bees, flies, butterflies, hummingbirds, bats or rodents. Although several studies have documented that pollinators can impose strong selection pressures on flowers, our understanding of how flowers diversify remains fragmentary. For example, does the entire flower adapt to a pollinator, or do only some flower parts evolve to fit a pollinator while other flower parts may remain unchanged?

Jack jumper program saving lives by shaking allergies to the potentially deadly ant

People who are allergic to jack jumpers have changed careers, stopped hobbies and even moved states to avoid the potentially deadly ant. A globally-unique program has been changing that, by training patients' bodies to stop being allergic. The ants are found in most Australian states, but Tasmania has the highest density, and a sting is a nasty but inevitable fact of life for anyone who goes outdoors. "We here in Tasmania are probably the world capital for dangerous ant-sting allergies," natural sciences collection officer at the Queen Victoria Museum and Art Gallery, Simon Fearn, said.

Azteca ant colonies move the same way leopards' spots form



What could Azteca ants in coffee farms in Mexico have in common with leopards' spots and zebras' stripes? After two decades of analyzing the rise, spread and collapse of Azteca ant colonies in a coffee farm in Mexico, University of Michigan researchers have proven that the ant distributions follow a pattern named after chemist Alan Turing, who first described it in 1952, that is said to explain leopards' spots and other patterns in nature. "The same equations that Turing used for chemistry, we can use in ecology," said John Vandermeer, a professor in the U-M Department of Ecology and Evolutionary Biology and first author of a study in the December issue of *BioScience*. "Those equations say you should get spots of predators and spots of prey in a system, and we've proven you do."

Sugar ants' preference for urine may reduce greenhouse gas emissions

An unlikely penchant for urine is putting a common sugar ant on the map, as new research from the University of South Australia shows their taste for urine could play a role in reducing greenhouse gases. Led by wildlife ecologist Associate Professor Topa Petit, the Kangaroo Island-based research found that sugar ants prefer urine over sugar -- the food source after which they're named -- nocturnally foraging on it to extract nitrogen molecules, some of which could end up in the greenhouse gas, nitrous oxide. The Australian-first study compared the behaviours of sugar ants (Camponotus terebrans) as they were exposed to different concentrations of urine (human and kangaroo ~ 2.5 per cent urea), sugar water (20 per cent and 40 per cent), and urea in water (at 2.5 per cent; 3.5 per cent; 7 per cent and 10 per cent), finding that sugar ants were most attracted to higher concentrations of urea, mining them for long periods within a dry sand substrate.

Antibiotic resistance and cancer: six surprising places scientists are looking for new drugs

Scientists recently announced the discovery of a novel antibiotic produced by bacteria living inside a nematode (roundworm). Although this molecule needs further analyses, the finding, published in Nature, brings hope to the fight against antimicrobial or antibiotic resistance, the growing ability of infectious and sometimes lethal bacteria to survive drug treatment. Some nematodes living in the soil harbour bacteria (Photorrabdus khanii) in their gut to help them when feeding on insect larvae. To kill other bacteria trying to feast on the larvae, P khanii releases the molecule darobactin. The researchers found that this compound is also very effective against another group of bacteria responsible for difficult-to-treat infections. Interestingly, the molecule acts without needing to cross the bacteria's outer cell wall, which is an obstacle for many other compounds. They also found that bacteria that spontaneously develop resistance to darobactin seem to lose the ability to infect their host.

Of ants and men: Ant behavior might mirror political polarization

Could the division of labor in an anthill be driven by the same social dynamics governing the gap between liberals and conservatives? That was the surprising question tackled by Princeton biologists Chris Tokita and Corina Tarnita. "Our findings suggest that division of labor and political polarization -- two social phenomena not typically considered together -- may actually be driven by the same process," said Tokita, a graduate student in ecology and evolutionary biology. "Division of labor is seen as a benefit to societies, while political polarization usually isn't, but we found that the same dynamics could theoretically give rise to them both."

Collaboration yields insights into mosquito reproduction

As carriers for diseases like dengue and Zika, mosquitoes kill more than 1 million people each year and sicken hundreds of millions more. But a better understanding of mosquito reproduction can help humans combat outbreaks of these diseases, which are worsening as the climate warms. Four Cornell researchers—two entomologists and two engineers—took a deeper look at this process. In a paper published in *Scientific Reports* on Dec. 6, they documented nanoscale changes in the sperm of Aedes aegypti mosquitoes and watched how the females' bodies responded during the insemination-to-fertilization period. "We want to understand reproduction because if you can figure out ways to stop reproduction in the field, you could have mass mosquito birth control," said Ethan Degner, Ph.D. '19, co-lead author of the paper along with Jade Noble, Ph.D. '18

Scientists find that unappetizing moths make less effort to escape attacking bats

You might think that prey would invariably flee in terror from a predator. But what if an animal was apathetic in the face of danger? A new study in *Frontiers in Ecology and Evolution* investigates why some moths are more relaxed fliers in the face of bat attacks. The research reveals that less appetizing moths are more nonchalant when attacked by bats, whereas more palatable moths tend to employ evasive maneuvers. The work demonstrates the complex risks and rewards of anti-predator strategies where mistakes invariably mean death, and may let scientists predict the evasive behaviors of rare or even extinct species.

Researchers discover how ant species uses abdomen for extra power during jumps

Researchers in the department of entomology at the University of Illinois have shown how a species of ant uses its abdomen to add speed to its jump, in a recent study published in *Integrative Organismal Biology*. With a name like Gigantiops destructor, one might expect this ant species to be large or aggressive, but these relatively shy ants common to South America are anything but. Compared to other notable Amazonian ants such as bullet, army and leafcutter ants, Gigantiops are smaller, less confrontational, and often overlooked as one walks through the rainforest. However, these ants are capable of a rather unique behavior—they travel through their leaf litter habitats by jumping—and rotating their abdomens to power part of that process.

Bark beetles control pathogenic fungi

Ants and honeybees share nests of hundreds or thousands of individuals in a very small space. Hence the risk is high that infectious diseases may spread rapidly. In order to reduce this risk, the animals have developed special social behaviors that are referred to as "social immune defense." This achievement is generally assumed to have evolved only in the eusocial insects including ants, bees and wasps. The finding that also more primitively social ambrosia beetles remove pathogens by cleaning each other indicates that social immunity may have evolved already much earlier. This was reported in the British science journal *Proceedings of the Royal Society B* by Jon A. Nuotclà and Michael Taborsky from the University of Bern (Switzerland), in collaboration with Peter Biedermann from the Julius-Maximilians-Universität (JMU) Würzburg in Bavaria, Germany.

Scientists bolt down the defenses against ambrosia beetles

Exotic ambrosia beetles are costly pests of ornamental and fruit trees nationwide—from front-yard plantings of Japanese maple and oak to commercially grown orchards of cherry, peach, plum and even avocado. Now, however, Agricultural Research Service (ARS) scientists may have found a way to turn the tables on the beetles. Unchecked, the two- to three-millimeter long pests tunnel into the sapwood of host trees and expose them to symbiotic fungi that obstruct the flow of nutrients. The researchers' tactic exploits a key weakness of ambrosia beetles—namely, their attraction to ethanol emitted by stressed, injured or dying trees and a reliance on the alcohol to "farm" gardens of the fungi as food without interference from other competing microbes.

The humming of Christmas beetles was once a sign of the season. Where have they gone?

How many Christmas beetles have you seen this year? The insects – a genus containing some 35 separate species – traditionally appear in summer. Many settlers saw the scarabs, shimmering in festive red and green, as embodying the European holiday tradition. "Some forgotten chord is strumming,' explained the folk poet Clement R E Grainger back in 1932, 'when beetles start their humming/ for they speak of joy and gladness/perfect love and deepest woe." Today that humming's become much more difficult to hear. Those of us who remember the beetles from our childhood can't help but notice how rarely they appear now. Entomologist Chris Reid, a research scientist at the Australian Museum, says beetle populations have almost certainly declined.

Scientists Just Discovered How Beetle 'Weapons' Grow

Specific insulin-like peptide regulates how beetle 'weapons' grow, revealing how larval nutrition leads to differently sized mandibles in broad-horned flour beetles. A scientist from Tokyo Metropolitan University and coworkers have discovered that a specific insulin-like peptide called *ILP2* regulates the size of "weapons" in *Gnatocerus cornutus* beetles in different nutritional environments. They found diminished mandible size when expression of the peptide was suppressed, and that it was specifically expressed in the "fat body," where beetles store nutrients. This has important implications for understanding how striking growth occurs in different environments for different organisms.

Parasitoid wasp species discovered in the Amazon can manipulate host's behavior

A research group from the Biodiversity Unit of the University of Turku studies the diversity of parasitoid insects around the world. Parasitoid wasps (Hymenoptera) are one of the most species rich animal taxa on Earth, but their tropical diversity is still poorly known. In the latest study, the group discovered 15 new, sizable species that parasitize spiders in the lowland rainforests of the Amazon and the cloud forests of the Andes. "The Acrotaphus wasps we studied are very interesting as they are able to manipulate the behavior of the host spider in a complex way. During the time period preceding the host spider's death, it does not spin a normal web for catching prey. Instead, the parasitoid wasp manipulates it into spinning a special web which protects the developing pupa from predators. Host manipulation is a rare phenomenon in nature, which makes these parasitoid wasps very exciting in terms of their evolution," says Ilari E. Sääksjärvi, Professor of Biodiversity research from the University of Turku.

Jewel beetles' sparkle helps them hide in plain sight

Bright colors are often considered an evolutionary tradeoff in the animal kingdom. Yes, a male peacock's colorful feathers may help it attract a mate, but they also make it more likely to be seen by a hungry jungle cat. Jewel beetles (*Sternocera aequisignata*) and their green, blue, and purple iridescent wing cases may be an exception to the rule, researchers report January 23 in the journal *Current Biology*. They found that the insects' bright colors can act as a form of camouflage. "The idea of 'iridescence as camouflage' is over 100 years old, but our study is the first to show that these early ignored or rejected ideas that 'changeable or metallic colors are among the strongest factors in animals' concealment' have traction," says first author Karin Kjernsmo, an evolutionary and behavioral ecologist at the University of Bristol, United Kingdom. "Both birds and humans really do have difficulty spotting iridescent objects in a natural, complex, forest environment."

Mud wasps used to date Australia's aboriginal rock art

When the veteran telecoms engineer Damien Finch went on a three-week bush walk in Australia's Kimberley region, he became enthralled with its rock art. On his return home, he tried to find out more about these enigmatic aboriginal paintings and engravings. "I couldn't believe how little was known about them; we didn't even know how old they were," Damien said. "It seemed disrespectful that scientists hadn't studied this stuff more; it was downplaying the importance of the culture," he told BBC News. Now, 10 years on and in his 60s, Damien is putting that right. He's approaching the end of his doctoral research on the topic, and in this week's Science Advances journal, has published his own efforts to age the Kimberley's so-called Gwion figures.

'Sustainable intensification' of cropping systems good for farmers, environment

By diversifying their crop rotations to create conditions that promote beneficial, predatory insects to combat pests, farmers can reduce their reliance on insecticides to control early-season crop pests, such as caterpillars, and still produce competitive yields of corn and soybeans. That's the conclusion of Penn State researchers who conducted a six-year comparison of two types of crop rotations under no-till production. One was a standard corn and soybeans rotation in which preventive insecticides were used twice annually to suppress caterpillars and other pests; the other a diversified rotation of corn, soybeans, winter wheat, and cover crops—hairy vetch or red clover—that used insecticides only as needed.

Return of the Zombie Cicadas: Manipulative Qualities of Fungal-Infected Flyers Unearthed

Mind games aren't exclusive to humans. Cicadas infected with the parasitic fungus *Massospora* unknowingly engage in trickery with their fellow insects, resulting in effective disease transmission, according to West Virginia University-led research. M*assospora* manipulates male cicadas into flicking their wings like females – a mating invitation – which tempts unsuspecting male cicadas and infects them. It's a recent discovery into the bizarre world of cicadas plagued by a psychedelic fungus that contains chemicals including those found in hallucinogenic mushrooms. The research, "Behavioral betrayal: How select fungal parasites enlist living insects to do their bidding," was published in the journal *PLOS Pathogens*.

Deadpool fly among new species named by scientists

During the past year CSIRO scientists have given scientific names to 165 new species, including tributes to Marvel characters Deadpool, Thor, Loki, and Black Widow along the way. Paying homage to another name creator, they also named a fly after Stan Lee, the comic book creator who named the Marvel characters. CSIRO entomologist Dr. Bryan Lessard, who himself goes by superhero name "Bry the Fly Guy" on social media, said naming new species is an important super-power in solving many of the world's challenges. "Deadpool fly is an assassin with markings on its back that resembles Deadpool's mask," Dr. Lessard said.

Mosquitoes evolved to suck human blood when they couldn't find water

Mosquitoes evolved to bite humans if they lived in places with intense dry seasons, according to a study of African mosquitoes. The insects need water to breed and may have latched onto people because we store it in large quantities. Many mosquitoes bite a wide range of animals, but some have specialised in biting humans and nobody knew why until now. *Aedes aegypti* mosquitoes often specialise in humans, bringing diseases like Zika, dengue and yellow fever with them. But some African populations of the species have a wider diet. Those living in areas where the dry season was long and intense were much more likely to prefer humans. There was also a smaller effect of urbanisation: mosquitoes in cities tended to prefer humans. A long dry season is a problem for *A. aegypti*, says Rose, because these mosquitoes depend on standing water to rear their young. But humans often create sources of standing water, whether by storing rainwater in barrels or by irrigating crop fields. Mosquitoes that lived thousands of years ago may have been drawn to these places and thus evolved to bite humans.

I'm searching firegrounds for surviving Kangaroo Island Micro-trapdoor spiders. 6 months on, I'm yet to find any

I'm standing on a hill in Kangaroo Island's Western River Wilderness Protection Area, looking over steep gullies and sweeping hillsides. As far as I can see, the landscape is burnt: bright patches of regrowth contrast with skeletal, blackened trunks. It's stark, yet strangely beautiful. It's late May, five months after the catastrophic summer fires burned 90% of the park. I'm here to assess the damage to some of our tiniest Australians. Among the invertebrates listed by the federal government as a priority for intervention is an unassuming, brownish-black spider with squat legs and a body about the size of a A$2 coin. Its name: the Kangaroo Island Micro-trapdoor spider (*Moggridgea rainbowi*).

Photo Corner

All Society member are encouraged to submit any entomological photographs of interest together with a short (or long) description of your observations.

The perils and joys of insect collecting. This guy was happily sunning itself at head height in a dead tickbush along the track to Marley Beach in Royal National Park in the middle of winter. 1.5m Diamond python (*Morelia spilota spilota*, a subspecies of the carpet python - it is the most southerly occurring python in the world. (Photo Garry Webb June 2020).

***Hesthesis cingulata* (Kirby) (Cerambycidae) emerged from corm/root of *Corymbia gummifera* (red bloodwood) (Photo: Garry Webb, September 2019)**

Ant adventures in Sulawesi (2003, Garry Webb)

Evaluating control options for ants infesting cacoa plantations

Yellow crazy Ant (*Anoplolepis gracilipes*) and *Nylanderia* sp. attending mealybug and the pros and cons of green tree ants (*Oecophylla smaragdina*) – biological control agent? or nuisance?


Green Tree Ant


Green Tree Ant


Green Tree Ant


Yellow Crazy Ant
attending mealybug


Green Tree Ant


Nylanderia sp.
attacking fruit stem

Anatomy of a termite trial - The development of a new termite bait (Darwin 2007)
(Dr Theo Evans and Patrick Gleeson CSIRO, Say Piau Lim and Garry Webb, Sumitomo Chemical)

References for anyone interested:

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