October 2021
Issue
No. 618

CIRCULAR OF THE ENTOMOLOGICAL SOCIETY OF NEW SOUTH WALES Inc

This month's member spotlight is yours truly. I wrote this the very day I took over as Tarsus editor and buried it the bottom draw for the inevitable day I couldn't solicit an alternative. Thanks to all those members who have contributed previously and I do hope that other members might volunteer some time to prepare their own for future editions. It really only takes a small amount of time and it will be interesting to all your fellow members.

This month there is a book alert for Ian Endersby's *The Distribution of Australian Dragonflies.*

Dinah Hales has kindly provided the text of her recent talk at the Powerhouse Museum on J.H. Maiden. He was not an entomologist but had a remarkable career as museum curator, technical educator, botanic gardens director and government botanist.

This month, in the Photo Corner section, I've put together another photo montage of ant work in the Northern Territory during 2003-2005. One again I'd be keen include any photos from other members in future editions. Don't be shy – anything of entomological interest is worthy.

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

Kind Regards

Garry Webb

Circular editor

Member Spotlight

Garry Webb

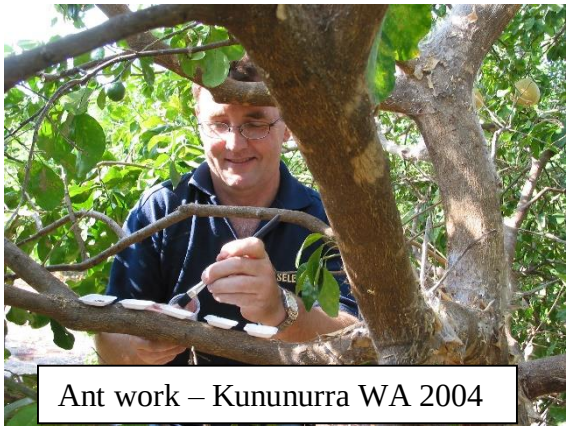
Early Life: I was born in Jannali, a new suburb in southern Sydney, in 1958, and grew up living next to a bushland reserve and spend much of my childhood roaming the bush, swimming in the creek (it was clean then) and catching critters. I was originally interested in reptiles and amphibians and much to my parent's dismay kept a few in the house. My entomological interest came much later.

Career: My first jobs, in rapid succession were clerical roles with the Soil Conservation Service and then NSW Forestry. Then in 1978 I transferred to a new role of Technical Officer in the Entomology Laboratory of the then Wood Technology and Forest Research Division of NSW Forestry. There I learnt the entomological ropes from entomologists like Bob Eldridge, Ted Taylor and Phil Hadlington, primarily targeted towards termites and timber borers but I also had a sneaking interest in pollination biology of native plants. During this time I completed a part-time Bachelor of Science degree over 6 years starting at University of

Ant work – Nhulunbuy NT 2004

Ant/Scale work – Swan Hill Vic 2003

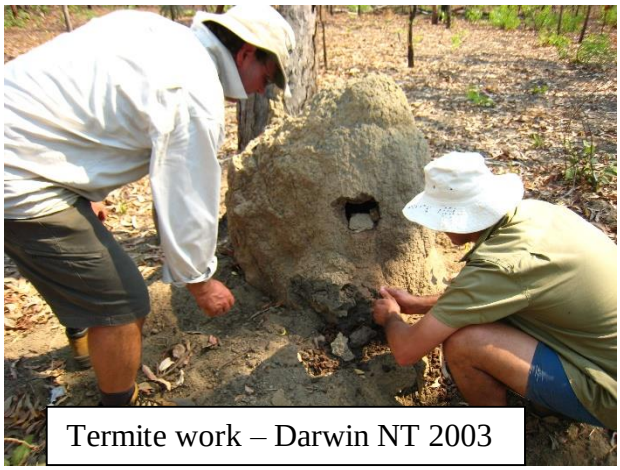
Technology and then transferred to Macquarie University where I finished. Strangely enough Peter Miller (a long standing member) (pictured below) was my lecturer in first year biology at UTS and Dinah Hales (another longstanding



Ant work – Kununurra WA 2004

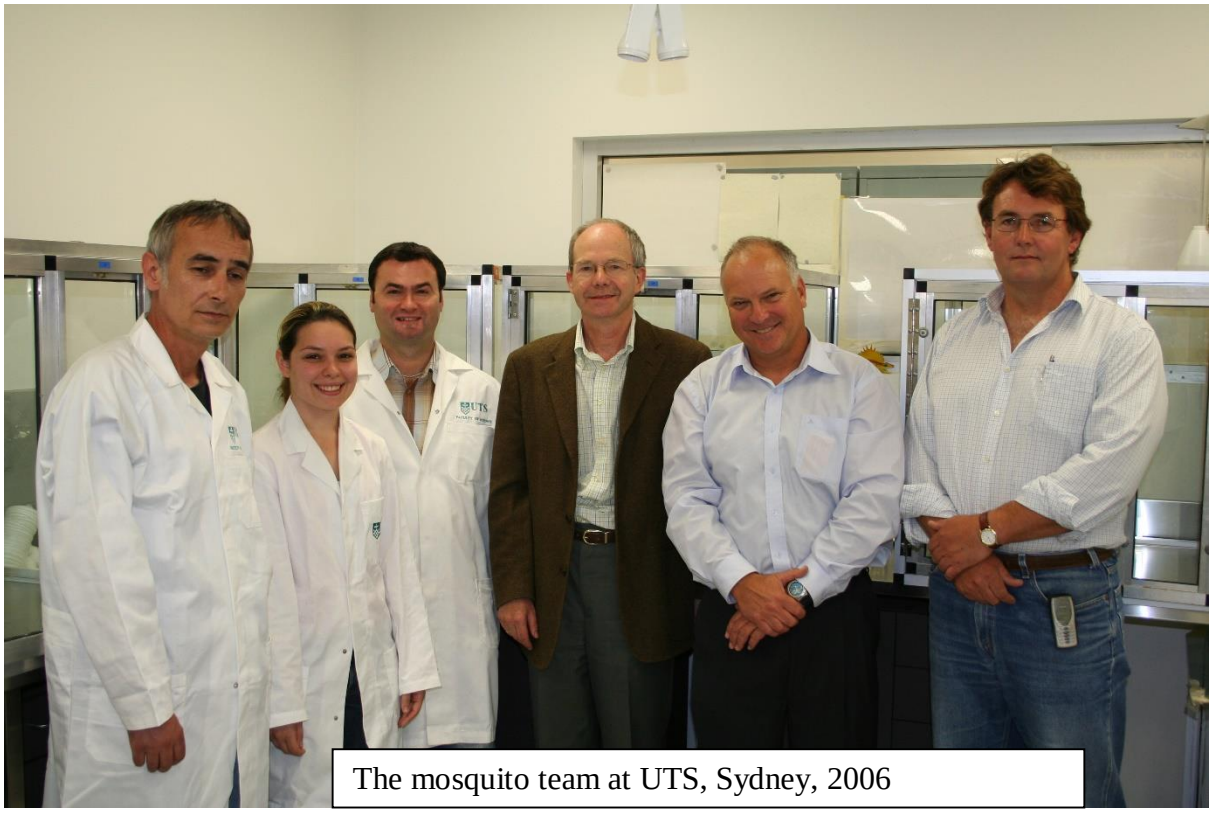
member) was my lecturer in invertebrate zoology at Macquarie University. In 1983 I commenced a Master of Science degree through Australian National University in Canberra. In 1988, with a 18% mortgage and new child to support it was time to move on. First step was a short stint with NSW Agriculture in their Pesticide Branch, reviewing new pesticide products. Very soon after they announced their move to Orange it was time to move on

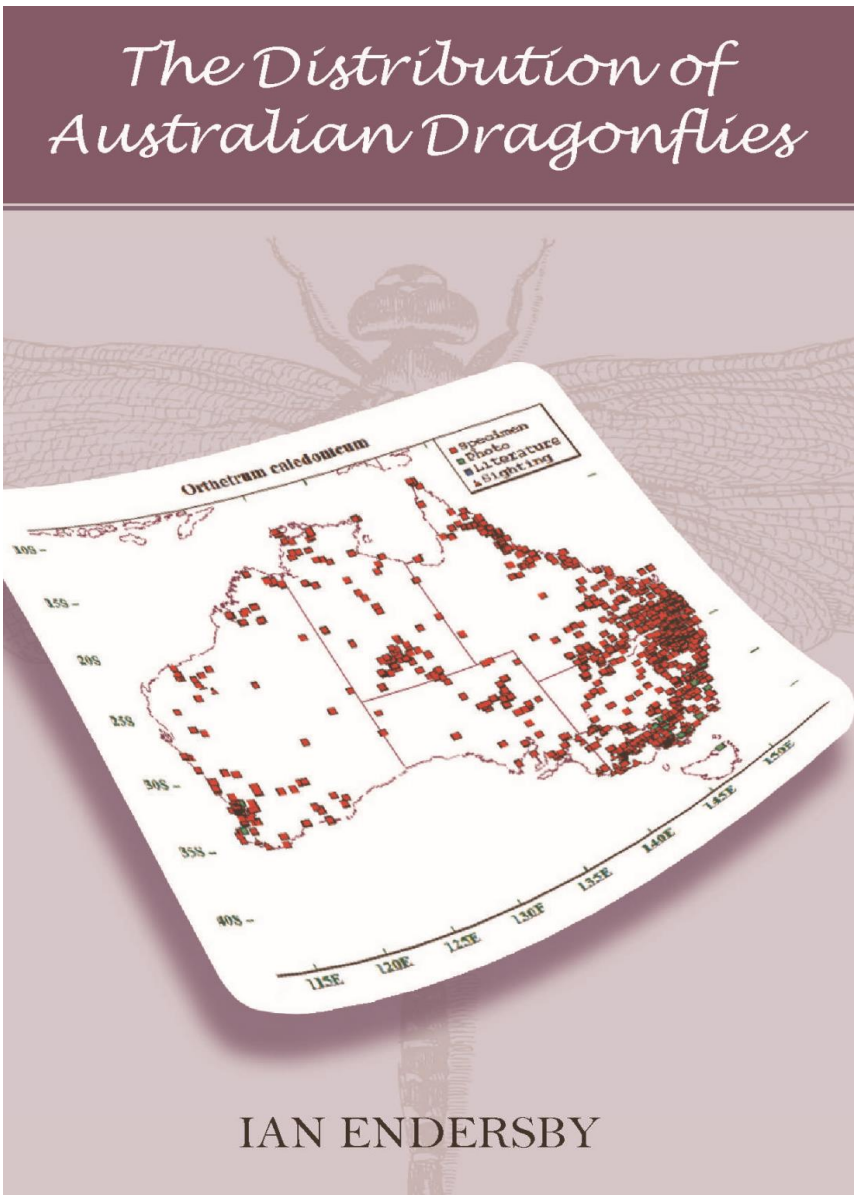
again, this time into the grey shadowy world of private industry. There I spent the past 30 odd years, firstly with Rhone-Poulenc Rural in various regulatory and technical roles and for the past twenty years with Sumitomo Chemical as Business Manager for Insecticides and more recently General Manager for Environmental Health. The work in both companies allowed me to travel extensively on all but the African and Antarctic continents and to many remote locations in Australia. I've lost count of the number of countries visited but I do recall having travelled to Japan at least 25 times. A few recent editions of Tarsus have highlighted some trips related to research on ants. My time at Sumitomo Chemical allowed me to get my hands dirty again with a lot of field work on developing bait technology for ants and termites, for which I still hold great interest. Early, self-imposed semi-retirement in 2017 allowed me to continue my work with invasive ants, particularly the red imported fire ant program in Queensland. I continue this through my consulting company Technomyrmex - some might recognise the name as the genus for white-footed house ant. In recent times, I've also been able to rekindle my interest in timber borers (mainly cerambycids, buprestids and curculionids) and pollination biology.


Termite work – Darwin NT 2003

Education: Bachelor of Science (Land Management and Ecology) (Macquarie), Master of Science (Forest Ecology) (ANU)

Current Interests: Invasive ants, timber borers, pollination biology.


The mosquito team at UTS, Sydney, 2006



I have recently published a book entitled *The Distribution of Australian Dragonflies*. It is based on data from nearly 60,000 specimens (mostly from Museum collections) and comprises three sections. The first is a set of point distribution maps – 325 in all, one for each species recorded from Australia.

Sections two and three provide calendars using collection dates as a surrogate for flight times. However, a species known from Cape York to southern Tasmania, for example, will differ across such a large range so the information was partitioned firstly by Biogeographical areas, of which Australia has 89 designated. The calendars show the number of adult specimens for each month arranged in the most recent taxonomic order. They are actual numbers, not standardised in any way, so the reader can judge the extent of the data. Biogeographic zones are based primarily on geological and botanical characteristics whereas dragonfly flight is more likely to be influenced by temperature and hydrology. The third section of the book sorts the data into Australia's 27 Climate Zones and provides a calendar for each.

Copies are not available commercially but can be obtained from the author in pdf format at no charge. Contact ian.endersby@ bigpond.com

Joseph Henry Maiden

Dinah Hales

Joseph Henry Maiden was a remarkable scientist and educator. Born in London in 1859, he was the eldest son of Henry Maiden, china dealer, and his wife Mary. According to the Australian Dictionary of Biography, Maiden was educated at the City of London Middle Class School where he excelled in scientific subjects. Ill-health prevented him from completing a science degree at the University of London where he was taught chemistry by Frederick Barff.[1]

It was thought that a warmer climate would benefit his health and he travelled to Australia in 1880. One of his first jobs in Sydney was to give lectures at Sydney Technical College. Through an introduction from Barff, he made contact with the professor of chemistry at the University of Sydney, Professor Liversidge. Liversidge was on a committee to appoint the first curator at the Technological, Industrial and Sanitary Museum (later to become the Powerhouse). The job was offered to Maiden and he took up the role in 1882 (or 1881?), enjoying it so much that he abandoned his plan of returning to England. Instead his fiancée set sail for Australia in 1883 and he rushed to Melbourne to meet her, and they were married the next day!

The Museum was initially in the Garden Palace in the Royal Botanic Gardens, but tragically burnt down in 1882, destroying the existing collection, including Maiden's plant collections. A very few specimens survived. One was the graphite elephant now representing the Foundation of the Museum of Applied Arts and Sciences. We can be confident that Maiden would have handled this specimen, and he set to work with his usual energy to rebuild the collection, at first housed in a building whose other purpose was to serve as the Sydney Hospital morgue. During his time at the Museum, Maiden built up the collection in its many aspects. He bought models of beneficial insects for the education of "men" interested in beekeeping or silk production. He bought models of edible and poisonous fungi. He bought a model of a piano mechanism. He bought an electroscope. There is a model of a floating crane which was most likely made by his son. The Strasbourg Clock was acquired during his tenure. The Museum's archives must contain many other examples of his purchases: he was known for his meticulous documentation.

Maiden's emphasis was always on practical education and he retained a close association with Sydney Technical College. The Museum moved to its first Harris St site, adjacent to the college, in 1893. In the following year he was appointed Superintendent of Technical Education, and in 1896, Government Botanist and Director of the Royal Botanic Gardens, where he remained until retirement. He developed the gardens and herbarium and organised the draining and sewerage of the area. The job included responsibility for the Domain, Centennial Park, Government House and various public buildings. He continued to donate material to the museum after his move to the Botanic Gardens,
He died in 1925, survived by his wife and four daughters - his son had died earlier at sea. His two youngest daughters were named Rose and Acacia, perhaps symbolic of his origins and his adopted country. Acacia chose to use her second name, Dorothy.

[1] Barff's career was also an interesting one, and included ordination in the Church of England, stained glass design and church architecture, conversion to Catholicism and some important discoveries including a technique for rust prevention.

One of his major legacies was the establishment of herbaria at the Museum and the RBG. He collected widely, in three-piece suit and tie. On a trip to Europe he was even successful in recovering some of Sir Joseph Banks's material from the voyage of the *Endeavour*. His work in economic botany, illustrated by his collections and displays at the Museum, led him back to basic science and he published extensively on identification and description of native trees, particularly *Eucalyptus* and *Acacia* species. Not only did he describe and name many species, but he had many named after him. He collected the majority of the timber samples in the museum and emphasised the useful properties of each species.

Maiden advocated the planting of street trees, generally uniform rows of the one species. He recommended Moreton Bay figs be spaced at 30 m (100 ft) intervals—far enough to avoid crowding as the trees matured, but close enough so that their branches would eventually interlock (Frawley 2009). The Moreton Bay figs of the Gardens and the Domain were the work of Maiden and his predecessor as Director of the RBG, Charles Moore. Maiden was also enthusiastic about the Canary Island Palm *Phoenix canariensis*, already promoted by Fred Turner, on the ground staff of the RBG during the 1880s. During his time Turner worked on beautifying Hyde Park and did so by the removal "about 60 Moreton Bay figs in one year" and planted groups of the palm, in their place. Turner was actually selected over Maiden for the Economic Botanist position in the Department of Agriculture, but was retrenched in 1893. The work by Moore and Maiden was sometimes decried by the populace "Oh, no! Not more Moreton bay figs!"

Maiden published work was monumental, especially on *Eucalyptus*. He was an early conservationist, with a special interest in conserving areas of rain forest, and the use of trees in soil stabilisation and flood control. He was on a committee to promote Wattle Day.

Scientific societies today have trouble getting committee members. Maiden served on the councils of the following societies in Sydney, often in the demanding roles of president or secretary:

- Linnean Society
- the Royal Society
- the (Royal) Australian Historical Society
- the Horticultural Society,
- the Horticultural Association
- Field Naturalists' Society.
- Geographical Society of Australasia
- Australasian Association for the Advancement of Science
- Australian National Research Council in 1919.
- and was a fellow of the Linnean, Chemical, Royal Geographical and Royal Horticultural societies of London.
- and was a corresponding member of societies in Europe and South America

He received the following awards and recognition:

- the gold medal of the Linnean Society of London in 1915,
- Fellow of the Royal Society
- Imperial Service Order 1916.

- He also received the Australian Association for Advancement of Science's Mueller medal (1922) and the NSW Royal Society's (W.B.) Clarke memorial medal (1924).

All this for a man with no tertiary qualifications and early ill-health! It wouldn't happen now, but Maiden had a list of achievements that few could rival. The Australian Entomological Society is considering accreditation of entomologists and one of the suggested criteria is possession of an appropriate degree. How would Maiden fit in if something similar was proposed for botanists?

Maiden's contribution to the Botanic Gardens is commemorated by the Maiden Pavilion, in a part of the Gardens now used for weddings. The pavilion was funded by public subscription and dedicated in 1930, in the presence of his daughters and their families.

Bibliography

The material for this account is derived largely from *Australian Dictionary of Biography* and the *Dictionary of Sydney*, both on line. The latter contains interesting photographs.

L.A. Gilbert published a biography of Maiden as below, but I have not been able to access it. It would enable more clarity about his early life at school and in the ambiguous years between school and travel to Australia, during which he apparently had some teaching experience. It would also pin down some dates where there is conflict in the online biographical sources: *Gilbert, Lionel Arthur (1 March 2001). The Little Giant: The Life & Work of Joseph Henry Maiden, 1859-1925. Sydney: Kardoorair Press in association with Royal Botanic Gardens..* ISBN 9780908244447. OCLC 54078075

Frawley, Jodi (2009). "Campaigning for Street Trees, Sydney Botanic Gardens 1890s–1920s" (PDF). *Environment and History.* ***15*** *(3): 303–22. doi:10.3197/096734009x12474738199953*

Frawley, Jodi. (2011). Maiden, Joseph, Dictionary of Sydney, , http://dictionaryofsydney.org/entry/maiden_joseph, viewed 02 Sep 2021.

Gilbert, L.A. (1990). Turner, Fred (1852–1939). Australian Dictionary of Biography, Volume 12 , 1990.

https://gracesguide.co.uk/Frederick_Settle_Barff

MAAS Collections Search for items linked to Maiden's time at the Museum

Lyons, M. & Pettigrew, C. J. 'Maiden, Joseph Henry (1859–1925)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, https://adb.anu.edu.au/biography/maiden-joseph-henry-7463/text12999, published first in hardcopy 1986, accessed online 26 August 2021.

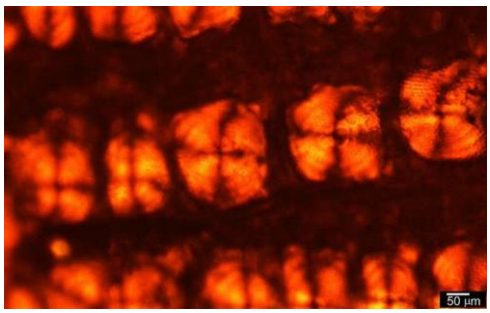
MAAS Collections Search for items linked to Maiden's time at the Museum.

New Entomological Research

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

Ants feeding off honeydew wins the Royal Society of Biology's photo prize

Revealing the secrets of ground beetle wing casings



The striking colors of many creatures in nature result from their structures at a microscopic or even nanoscopic level. A good example of this is the metallic coloring of certain beetles. Researchers have paid increased attention to understanding what causes the effects found in nature, so that they can recreate these properties in so-called biomimetic materials. A team from The University of Tsukuba has taken a very close look at the ground beetle to see what we can learn from its micro/nano structure. Their findings are published in *Micron*. Nature provides us with thousands of examples of effective materials that have already been finely tuned to exhibit a wide range of properties from color to strength. It therefore makes sense for researchers to study real samples as inspiration for new developments rather than starting with a blank page. The eye-catching optical effects of certain species of butterfly and beetle, such as the ground beetle, are excellent examples of what is known as photonic structure. These effects are the result of microscopic regular patterns in the structure and are expected to be translated into interesting applications in materials science. The researchers used three different techniques—polarizing optical microscopy (POM), scanning electron microscopy (SEM), and synchrotron X-ray diffraction (XRD)—to get a close look at the exoskeleton of the ground beetle.

From dragonflies to kingfishers: The science behind nature's brilliant blues

Sitting by the edge of a river on a lazy summer's day, the sky is a beautiful blue overhead. Lush greenery crowds the bank. The river is alive: minnows, coots and water voles fuss at the water's edge. Amid this truly delightful scene, most eye-catching of all are the brilliant flashes of blue: on the bodies of dragonflies, the wings of mallard drakes, and the eye-catching feathers of any fast-gliding kingfishers that patrol the river. These creatures gleam with the same distinctive blue we see in peacock plumage and Amazon butterflies. It's a jewel-like, metallic hue that serves a particular purpose: to help these creatures stand out against their comparatively dull environment. But how do these plants and animals acquire their magical blue shimmer? A true blue pigment is actually relatively rare in nature, so plants and animals instead perform tricks with the light to generate this dazzling effect.

Researchers look for ways to boost bee-friendly practices

Almonds are big business in California, which grows 80 percent of the world's crop with a value of $5.62 billion. To get those almonds to grow, farmers need bees to pollinate their crop. And bee populations have been suffering sharp declines in recent years, part of a pattern of widespread loss of pollinator diversity and abundance. Now a UO biologist and former UO postdoctoral fellow have looked for ways to incentivize almond growers to adopt bee-friendly practices, such as planting cover crops, adopting permanent pollinator habitat and adopting best management practices for bees. They found no silver bullet, but they learned that the location of almond groves played a central role in the adoption of bee-friendly practices, as well as concern for future pollination services. Their findings suggest a regionally flexible conservation strategy focused on supporting honeybee colonies might have the highest likelihood of grower participation and adoption. The paper by Jennie Durant and Lauren Ponisio was published in the journal *Frontiers in Sustainable Food Systems* this summer. Ponisio is an assistant biology professor in the Institute of Ecology and Evolution in the UO Department of Biology. Durant was a postdoctoral fellow at the UO with the National Institute of Food and Agriculture when they conducted the study. She now is a science and technology policy fellow with the American Association for the Advancement of Science, working for the U.S. Department of Agriculture.

Back-Seat Driver: The Parasite That Makes Bees Drop Off Its Babies

From a human perspective, insects are odd, odd creatures. Some display the wonder of complete metamorphosis, allowing us to simultaneously love nectar-sipping butterflies and fret over their leaf-eating caterpillar offspring. We marvel at strange or seemingly impossible ways of life: dung-rolling beetles, reproduction with no males required, death by sex for honey bee males. And near the apex of oddness are the strepsipterans, aka the twisted-wing insects. Strepsipterans parasitize a wide array of other insects. The males are free-flying but the females of many species achieve independent mobility only as first instar larvae—which is when they seek out a host to live within for the rest of their lives. The females don't develop into "typical" adult insects—they have no wings, no legs, no eyes—but they are fertile and manage to mate even though they live inside another insect. These females have a brood canal (also the mating portal) and they stick the body part that has that canal outside the host and release a pheromone, calling the males to them. Adult males live for only a few hours, and that time is all about finding and mating with one of those protruding body parts. A new study published in the *Journal of Insect Science* shows that at least one species of strepsipteran, *Halictoxenos borealis*, also seems to have a super-power—mind-control of its host insect.

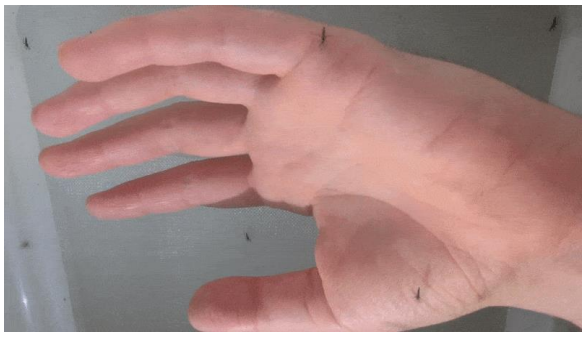
Scientists zero in on how termites coordinate mating behavior for colony success

By utilizing two of the most invasive termite species in Florida, scientists have gained insights at how animals living in groups—termites particularly—coordinate their leader-follower behaviors to thrive. Thomas Chouvenc, an assistant professor of urban entomology at the UF/IFAS Fort Lauderdale Research and Education Center (REC), collaborated with colleagues at Arizona State University on new research. In the study, scientists used Formosan subterranean termites and Asian subterranean termites—two of the most invasive species in Florida. A new paper "Coordination of movement via complementary interactions of leaders and followers in termite mating pairs" in the *Proceedings of the Royal Society B* explores the hidden relationship in termite species behind the behavioral traits of leaders and followers. As social insects, termite queen and king wannabes directly influence their respective movement for mating success and survival. The key is in the female's pheromones. In termites, during the mating season, winged individuals fly from their colonies to find a mate and create a new colony. The female produces a pheromone that allows a male to find her. In this interaction, the female is the leader, while the male is the follower, as both partners look for a place to start a colony.

"Insect Apocalypse" – Study Reveals Drastic Decline of Aquatic Insect Population in Paraná River Basin

Research conducted in Brazil for more than 20 years in the Paraná River basin shows a drastic fall in the number of aquatic insects in the region, which is considered well-preserved and distant from the negative impacts of agriculture, cattle breeding, and urbanization. The fieldwork was done by researchers affiliated with the State University of Maringá's Center for Research in Limnology, Ichthyology and Aquaculture (NUPELIA-UEM). The data was systematized by Gustavo Romero, a professor at the University of Campinas's Institute of Biology (IB-UNICAMP). An article on the study is published in a special issue on insect decline of *Biology Letters*, a journal of the UK's Royal Society. "Our study analyzed data collected on a seasonal basis over a 20-year period. We detected a decline from thousands to tens of individuals per square meter," Romero told Agência FAPESP. A commentary on the study by one member of the team is **published** in *The Conversation*. The drastic decline in insect populations is a global phenomenon, Romero said, and studies have shown its correlation with human activities. A meta-analysis published in ***Science*** pointed to a fall in the number of terrestrial insects but claimed to have detected a rise in the abundance of aquatic insects. This article has since been contested by critics who argue that its authors based their conclusions on too small a sample, with only 7% of the insect datasets in their analysis coming from the tropics and the rest almost exclusively from the United States and Europe.

Male mosquitoes don't want your blood, but they still find you very attractive



The whine of the mosquito is unpleasant and often inescapable outdoors on summer evenings. Mosquitoes track you down from tens of metres away by sensing carbon dioxide in the air you breathe out. Within seconds, they home in on exposed skin and feast on your blood with an array of specialized needles. Only female mosquitoes drink blood, which is how they spread deadly diseases like dengue fever and malaria. Males mosquitoes are harmless, mostly feeding on nectar, but our new research confirms they are just as annoying as female mosquitoes. Our study, published in the Journal of Medical Entomology, dispels a common misconception that male mosquitoes avoid people. In fact, male mosquitoes from at least one common species probably like you just as much as females do – but the reason for their fondness and the way they express it are very different.

Bees Are Dying in Large Numbers Around the World – Plant Compound May Protect Them From Deadly Virus

Around the world, honeybees are dying in large numbers. This die-off is in part because of a deadly virus that can kill bees or impair their ability to return to the hives after foraging. But in a study published today (September 28, 2021) in the journal *iScience*, researchers show that a cheap and naturally occurring chemical compound could prevent or reverse the effects of the virus in bees. Bees that were fed the compound before becoming infected were nine times more likely to survive the virus after five days; by monitoring hives in real time, the researchers also showed that bees that were fed the compound were more likely to return to the hive at the end of a foraging day. The deformed wing virus, transmitted by a parasite called a varroa mite, can infect bees throughout their lifecycle. Severely infected bees will die within days or have poorly developed wings that impair their ability to fly and forage. Previous research also shows that the virus can impair a bee's learning and memory, which could affect their ability to find home after hunting for food. Lost bees are likely to die, and their colony may eventually collapse because of a lack of food. "Pathogens are definitely a stressor for bees," says first author Cheng-Kang Tang at National Taiwan University. "But the beekeepers don't want to use pesticides because of food safety concerns. So, we set out to find some compounds that can increase the strength of bees."

Hoverflies navigate using sun and body clock

Hoverflies use a combination of the sun and their body clock to navigate when they fly south for the winter, new research shows. The insects keep the sun on their left in the morning, then gradually adjust to maintain a southward route as the day goes on. Pied and yellow-clubbed hoverflies -- which are important pollinators -- spend their summers in locations such as the UK and Scandinavia, then fly to the Mediterranean and North Africa in autumn. These migrations are known to happen on sunny days, but the new study -- led by the University of Exeter -- is the first proof of a "time-compensated sun compass" in hoverflies. "Simply flying towards the sun would lead them south, but this would create a winding, inefficient route," said lead author Richard Massy, of the Centre for Ecology and Conservation on Exeter's Penryn Campus in Cornwall. "Our study shows that hoverflies account for the sun's movement using their circadian rhythm.

Moth Wingtips Structured To Reflect Sound: An "Acoustic Decoy" To Thwart Bat Attack

Researchers at the University of Bristol have discovered that the tips of some saturniid moth forewings are curiously rippled and folded. They found that these unique structures strongly reflect sound, meaning that a bat hunting using echolocation is more likely to attack the wingtip region of the moth over the body, potentially saving the moth's life. They also discovered that the ripples and folds of the forewing tips have evolved to act as hemispheric and corner retroreflectors respectively, meaning that they reflect sound strongly back to its point of origin. Coupled together, the folds and ripples of these wingtips cover a huge range of incident sounds angles, meaning that over the entire wingbeat cycle of a flying moth and most possible positions of an attacking bat, the wingtip would consistently produce the strongest echoes. The acoustic protection of wingtips is even stronger than that of common hindwing decoys. Prof Marc Holderied of Bristol's School of Biological Sciences explained: "We have demonstrated that the folded and rippled wingtips on the forewings of some silkmoths act as acoustic decoys.

The South African farm turning flies into food for pets - and maybe people

"You've got a food shortage, and people who are starving, and then you've got a waste problem at the same time. So I started looking at how we can rebalance that," said founder Dean Smorenberg, reflecting on what inspired him to get into this field. He is a former management consultant who began farming black soldier flies in his bathroom in 2016 before entering the business full-time. The model is an appealing one to carbon-conscious consumers: the fly larvae feed on waste food products - in this case mainly spent grains from a nearby brewery - turning it into marketable protein and producing a fertiliser by-product. The process consumes significantly less water and land than other types of protein production and is far less carbon intensive. A 2020 study by researchers in the UK and Germany found that the global pet-food market releases as much carbon dioxide into the atmosphere as the total emissions of the Philippines or Mozambique. Rather than looking to directly challenge the massive global soy or fishmeal industries, which currently provide much of the world's affordable protein, Maltento is looking to offer products that supplement a pet food's flavour or nutritional properties.

Climate change: Dragonflies spread north in warming world

Dragonflies are moving northwards across Britain and Ireland as temperatures rise. More than 40% of species have increased their distribution since 1970, while only about 10% have declined, according to a new report. Experts from the British Dragonfly Society say it's an indicator of the effects of climate change. There is concern over the loss of populations of insects due to factors such as pollution and habitat loss. Conservation officer Eleanor Colver said while their data can determine where dragonflies are, it cannot determine exactly how many there are - and whether numbers have increased overall. "Factors such as the use of pesticides (reducing their flying insect prey), water pollution and habitat loss continue to threaten the health of dragonfly populations within species' existing ranges," she said.

Light pollution from street lamps linked to insect loss

Scientists say light pollution may be contributing to "worrying" declines in insects seen in recent decades. In a UK study, artificial street lights were found to disrupt the behaviour of nocturnal moths, reducing caterpillars numbers by half. Modern LED streetlights appeared to have the biggest impact. There is growing evidence that insect populations are shrinking due to the likes of climate change, habitat loss and pesticides. Factors are complex and varied, including the steady loss of forests, heathlands, meadows and marshes, overuse of pesticides, climate change and pollution of rivers and lakes. The use of artificial lights at night-time has been proposed as another driver of insect decline, although the scale remains unclear.

Angry Bees Produce Better Venom – Effective Treatment for Degenerative and Infectious Diseases

Researchers at Curtin revealed how behavioral and ecological factors influence the quality of bee venom, a product widely known for its effective treatment of degenerative and infectious diseases such as Parkinson's and osteoarthritis. The study, published in *PLOS*, analyzed – for the first time – protein diversity in bee venom produced by the western honeybee in the marri ecosystem in southern-western Australia. Lead researcher Dr. Daniela Scaccabarozzi, from Curtin's School of Molecular and Life Sciences and research consultant at ChemCentre, said the research would be of substantial benefit to both human health and the lucrative beekeeping business, where bee venom is being sold for up to $300 per gram. "We found there are 99 bee venom proteins of which about one-third had been formerly identified. The more proteins found in the venom, the higher the potential quality and effect," Dr. Scaccabarozzi said. "To understand the protein diversity of bee venom and find out what drivers impacted this, the multidisciplinary research team looked at a range of factors including the behavioral patterns of the bees. "A compelling behavioral factor was

revealed by the association between docile and active bees. Interestingly, we discovered that the 'angry bees' that reacted intensively to our stimulating devices produced a richer, more protein-dense bee venom.

The Incredible Secret Science of Ants' Underground Cities: How Ants Build Amazingly Complex and Stable Structures

Picture an anthill. What do you see? A small mound of sand and crumbly dirt poking up through the lawn? A tiny hole disappearing into the ground? A few ants scrambling around busily. Not very impressive, right? But slip beneath the surface and the above-ground simplicity gives way to subterranean complexity. Tunnels dive downward, branching and leading to specialized chambers that serve as home for the colony's queen, as nurseries for its young, as farms for fungus cultivated for food, and as dumps for its trash. These are not just burrows. They are underground cities, some of them home to millions of individuals, reaching as far as 25 feet underground, often lasting for decades. This kind of construction would be an impressive undertaking for most creatures, but when performed by animals that don't get much bigger than your fingernail, it is especially remarkable. Now, driven by the desire to improve our own ability to dig underground—whether it is for mining, subways, or underground farming—a team of researchers from Caltech has unraveled one of the secrets behind how ants build these amazingly complex and stable structures.

Wild bees need diverse agricultural landscapes

Mass-flowering crops such as oilseed rape or faba bean (also known as broad bean) provide valuable sources of food for bees, which, in turn, contribute to the pollination of both the crops and nearby wild plants when they visit. But not every arable crop that produces flowers is visited by the same bees. A team from the University of Göttingen and the Julius Kühn Institute (JKI) in Braunschweig has investigated how the habitat diversity of the agricultural landscape and the cultivation of different mass-flowering crops affect wild bees. The research shows that diverse agricultural landscapes increase the species richness of wild bees. Flowering arable crops with different flower shapes support different wild bee species. The results of the study have been published in *Landscape Ecology*.

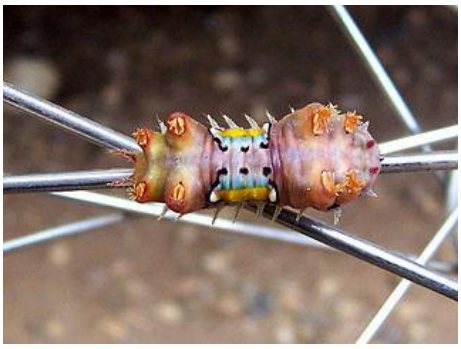
Mosquito love songs send mixed message about immunity

As mosquito-borne diseases pose risks for half the world's population, scientists have been releasing sterile or genetically modified male mosquitos in attempts to suppress populations or alter their traits to control human disease. But these technologies have failed to spread very rapidly because they require successful mating of modified mosquitoes with mosquitoes in nature and not enough research exists to fully explain which male traits females seek when they choose a mate. Now, a new Cornell study of *Aedes aegypti* mosquitoes investigates how a mating cue called "harmonic convergence" might affect immunity against parasites, bacteria and dengue virus in offspring, which has important implications for trade-offs male mosquitoes make between investing energy towards immunity or investing it on traits that impact mating and fitness.

Bee-impersonating flies show pollinator potential

A tiny bee imposter, the syrphid fly, may be a big help to some gardens and farms, new research from Washington State University shows. An observational study in Western Washington found that out of more than 2,400 pollinator visits to flowers at urban and rural farms about 35% of were made by flies -- most of which were the black-and-yellow-striped syrphid flies, also called hover flies. For a few plants, including peas, kale and lilies, flies were the only pollinators observed. Overall, bees were still the most common, accounting for about 61% of floral visits, but the rest were made by other insects and spiders. "We found that there really were a dramatic number of pollinators visiting flowers that were not bees," said Rae Olsson, a WSU post-doctoral fellow and lead author of the study published in *Food Webs*. "The majority of the non-bee pollinators were flies, and most of those were syrphid flies which is a group that commonly mimics bees."

Venomous caterpillar has strange biology



The venom of a caterpillar, native to South East Queensland, shows promise for use in medicines and pest control, Institute for Molecular Bioscience researchers say. The *Doratifera vulnerans* is common to large parts of Queensland's south-east and is routinely found in Toohey Forest Park on Brisbane's southside. Dr Andrew Walker has been researching the striking looking caterpillar since 2017. "We found one while collecting assassin bugs near Toowoomba and its strange biology and pain-causing venom fascinated me," Dr Walker said. Unlike The Very Hungry Caterpillar that charmed generations of children around the world, this caterpillar is far from harmless. "Its binomial name means 'bearer of gifts of wounds'," Dr Walker said. Dr Walker's research found the caterpillar has venom toxins with a molecular structure similar to those produced by spiders, wasps, bees and ants.

Australia or Africa? The botanical controversy over who can call their plants 'Acacia'

As chilly winds sweep across south-eastern Australia, the first wattles of the season are preparing to burst into fluffy pom-poms of resplendent gold and pale cream. Wattle — scientific name Acacia — is synonymous with this land. We have around 1,000 acacia species across the continent, more than twice the number of the next largest plant group, eucalyptus. Wattle wood, sap and seeds served and sustained First Nations people for millennia. Yet Australia is not alone in having a deep connection to acacias. Plants called acacia are found around the tropics and throughout Africa, where they also hold enormous cultural and economic significance. And in the 2000s, this unassuming posse of plants was at the centre of one of the world's biggest botanical controversies: who gets to call their acacias "Acacia"?

Entomologists discover dozens of new beetle species—and name some after iconic sci-fi heroines

The original Star Trek television series took place in a future when space is the final frontier, but humanity hasn't reached that point quite yet. As researchers like Michigan State University entomologists Sarah Smith and Anthony Cognato are reminding us, there's still plenty to discover right here on Earth. Working in Central and South America, the duo discovered more than three dozen species of ambrosia beetles—beetles that eat ambrosia fungus—previously unknown to science. Smith and Cognato described these new species on June 16 in the journal *ZooKeys*. The Spartans also selected an unusual naming theme named in deference to the female beetles who have helped their species survive and thrive by boldly going where they hadn't before. Many of the new species are named for iconic female science fiction characters, including Nyota Uhura of "Star Trek"; Kara "Starbuck" Thrace from the 2000s "Battlestar Galactica" TV series; and Katniss Everdeen from "The Hunger Games" books and movies.

New evidence links insect population collapse to dams

Insects are the most numerous group of animals on the planet. There are an estimated 5.5 million species, 80% of which remain to be discovered. Yet insects are experiencing steep, widespread declines across the world: a "death by a thousand cuts" because of human activity. Insects perform almost every role imaginable in an ecosystem, including pollinating crops, keeping pests under control, and acting as food for other animals. The potential consequences of their decline are so dire that it has been dubbed the "insect apocalypse." Following the flurry of attention this impending environmental catastrophe generated, a more complex picture has emerged—with one gap in our understanding glaringly clear. Despite tropical and subtropical regions housing an estimated 85% of Earth's insects, what is happening in those regions is critically understudied.

Photo Corner

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

Ant Adventures in the Northern Territory (2003+)

Bait application for yellow crazy ant in Arnhem Land by helicopter

Testing of new baits for invasive and nuisance ants in Darwin, Katherine, Nhulunbuy

Meat ants are a problem in citrus because they tend scale insects - Katherine

Testing baits for tropical fire ant - Darwin

Green tree ants in mangoes (friend and foe) - Darwin

The highly invasive yellow Crazy ant is a problem in conservation areas - Nhulunbuy

Black ants (*Iridomyrmex*) can be a problem in dragonfruit plantations - Darwin

Bigheaded ant (*Pheidole megacephala*) can be damaging to lowhanging jackfruit - Darwin

Bigheaded ant and Singapore ant are major problems in suburban Darwin and elsewhere

SOCIETY POSTAL ADDRESS	MEMBERSHIP FEES 2021	
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THE AUSTRALIAN MUSEUM	COMPANY ASSOCIATES	$60
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SYDNEY NSW 2010	CORPORATE MEMBERS	$150

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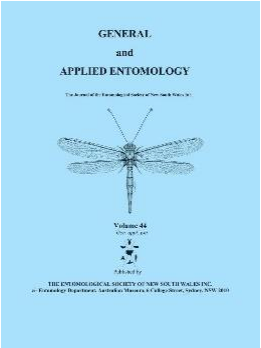

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