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Issue

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CIRCULAR OF THE ENTOMOLOGICAL SOCIETY OF NEW SOUTH WALES Inc

This month there is no member profile. We still have plenty of members we would like to hear from, so please spare a little time.

Mike Bouffard and Jocelyn Bornemissza have provided an interesting photo of a display they prepared for the Pooseum, a quirky little museum at Richmond, Tasmania with a focus on "poo" run by Karen Koch. The display features dung beetles collected by the late George Bornemissza during his time with CSIRO working on dung beetles.

The Ted Taylor prize for entomological students is open for entries. $1000 is on offer for the best student submission.

We also have a blast from the past for Howard Greening, a long standing member of the society who once worked on grain protection insects for NSWDPI. Bernie Dominiak has found an old paper of Howards from 1969. It might be interesting to resurrect old papers from "old" entomologists in the society, and there are many of us!. Some of these papers get lost in time and hard to find. Anyone like to own up to some old obscure publication?.

We encourage members to provided items of entomological interest to include in the newsletter.

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

Kind Regards

tcheddle

Garry Webb Thomas Heddle

Circular editors

George Bornemissza's Dung beetles at the Pooseum.
https://pooseum.com.au/about/

Ted Taylor Award
https://www.entsocnsw.org.au/awards/

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 open to students who are currently enrolled at a NSW University at any level.

To apply, submit a text article relating to insect biology. The article should be written to engage a wide audience and be no more than 1500 words in length. A single figure may also be submitted as part of the entry. No more than five references should be included.

The judging panel will be comprised of entomologists and outreach providers. Entries may be published in the Society's journal, *General & Applied Entomology*, or the Society's magazine *Tarsus*. All students entering receive free membership of the Society for one year. Entries are now open and can be submitted using the online form below.

Entry closing due: 20th October 2023.
Only one submission per person allowed.

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

GRAIN INSECTS IN FARM MACHINERY AND STORAGES

A Survey of Wheat Farms in the Tamworth District

THE SURVIVAL BETWEEN HARVESTS of grain-infesting insects in harvesting equipment and storages on the farm has been regarded as the major cause of insect contamination of newly harvested wheat.

Although most farmers interviewed were aware of the need to control grain insects, infestation was found on 14 of the 15 farms surveyed in the Tamworth district before the 1968–9 harvest.

All harvesting and handling equipment should be thoroughly cleaned immediately after harvest. As silos and grain stores empty, all grain residues should be removed. These measures are regarded as the foundation of control of grain insects on the farm.

Concern about wheat becoming infested before delivery to grain handling authorities motivated the Australian Wheat Board to organize extensive pre-harvest publicity which, since 1964, has stressed the importance of ensuring that farm machinery and storages are free of insects before harvesting commences. During the 1968–9 season the campaign cost over $4,000 in New South Wales alone.

A survey of 15 wheat farms in the Tamworth district was conducted early in November, 1968, about 2 weeks before wheat harvesting began in the district, to examine farm harvesting equipment and storages for grain-infesting insects, and assess farmers' awareness of publicity about control of grain pests. On each property the header, trucking bins, auger, empty silos and seed or feed grain storages were inspected. Grain residue found in machinery and empty storages was brushed out and sieved to detect insect infestation, and the number of insects present was recorded. These samples were of various sizes. To examine stored grain, a sample of about 1½ lb grain was sieved from each bag or from an outlet at the base of the silo.

Location of infestation

Insect pests of stored grain were found on 14 of the 15 farms. The results of these inspections are presented in the table.

Headers usually had some grain residue in the front auger casing, in the chick-weed box, at the bottom of the elevator casing, and in the header bin. Residue was infested by insect pests in half of the headers inspected. Six of the headers had been used to harvest sorghum since the previous wheat harvest but insects still occurred in 4 of these, in mixed wheat and sorghum residues.

Trucking bins and field bins were usually clean. Where grain had been left in augers, very heavy insect infestation occurred and rat excreta were also found. Empty iron silos had generally been well cleaned and some had been fumigated with phosphine (Phostoxin®) or sprayed with maldison (Malathion®) residual insecticide.

On one farm, temporary bulk bins, of hessian-covered welded mesh construction, contained infested oat residue on the earth floor. Infested seed or feed grain, usually bagged, was found on most farms. Of two seed drills examined, only one contained seed wheat and this was free of insects.

® registered trade name

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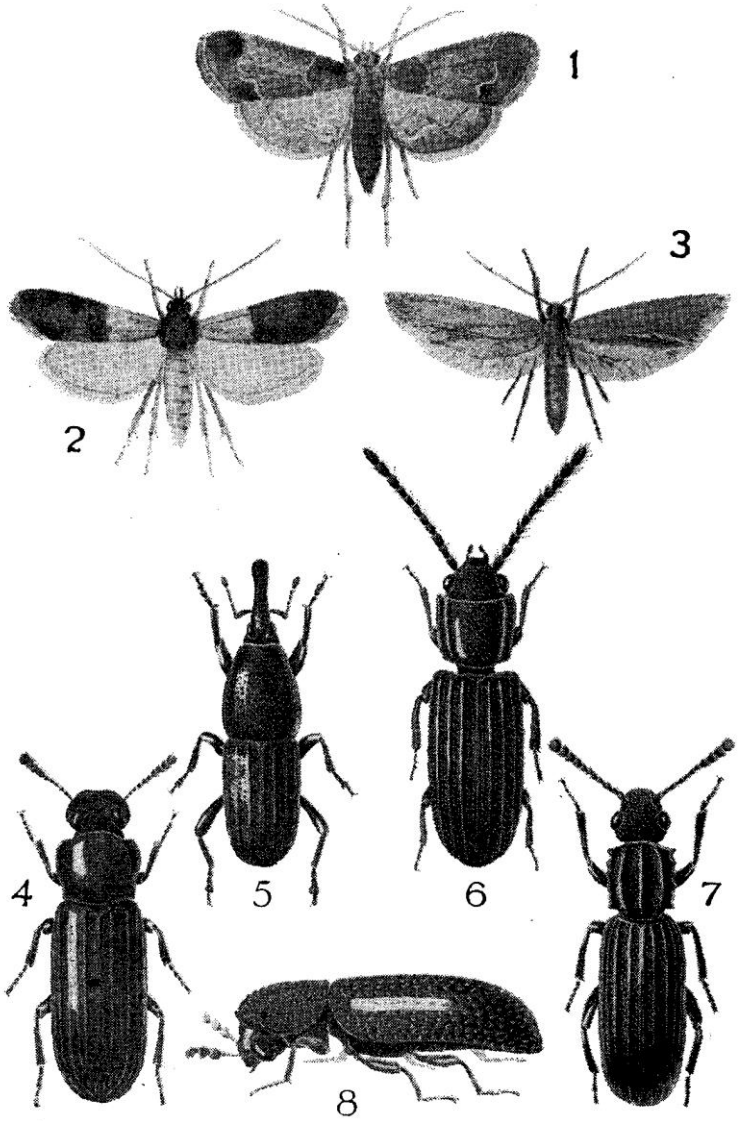

Eight common insect pests of stored grain:

1. Meal snout moth, *Pyralis farinalis.*

2. Indian meal moth, *Plodia interpunctella.*

3. Angoumois grain moth, *Sitotroga cerealella.*

4. Confused flour beetle, *Tribolium confusum.*

5. Rice weevil, *Sitophilus oryzae.*

6. Flat grain beetle, *Cryptolestes* sp.

7. Saw-toothed grain beetle, *Oryzaephilus surinamensis.*

8. Lesser grain borer, *Rhyzopertha dominica.*

The Agricultural Gazette of New South Wales, October, 1969

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Insects in Machinery and Storages

Farm	Header	Trucking bins	Auger	Empty silos	Seed store	Feed grain
1.	0	‡	‖	‖	‡	‡
2.	0	0*	‖	‖	§	0
3.	†	0	‖	0	†	‡
4.	0	‖	‖	†	‖	0
5.	0	0	‖	0*	0	0
6.	‖	‖	‖	‖	‖	* ‡
7.	‡	0	0	‖	‖	§
8.	0*	†	‖	‖	†	‡
9.	0	0	§	0	†	§
10.	†	0	0	†	‖	§
11.	‡	0	0	0	‖	‖
12.	†	0	0	0	‖	‡
13.	0	0	§	0	†	‖
14.	‡	‖	0	‖	‖	‖
15.	‡	0	‡	‖	‡	§

0 No insect infestation (asterisk indicates new equipment).
† 1–10 insects present.
‡ 11–20 insects present.
§ More than 20 insects present.
‖ Equipment or storage not present.

Insects found

The main insects found in headers and augers were the lesser grain borer, *Rhyzopertha dominica,* the rice weevil, *Sitophilus oryzae,* and the rust-red flour beetle, *Tribolium castaneum,* in residues of wheat and sorghum. The saw-toothed grain beetle, *Oryzaephilus surinamensis,* the confused flour beetle, *Tribolium confusum,* the long-headed flour beetle, *Latheticus oryzae,* and the flat grain beetle, *Cryptolestes* sp., were also found in headers and augers. All these insects were frequently very numerous in grain stored on farms for animal feed or for seed. Spilt grain in grain storage buildings was also infested by the cadelle, *Tenebroides mauritanicus,* and the dark mealworm, *Tenebrio obscurus.* The meal snout moth, *Pyralis farinalis,* occurred in a stack of used wheat sacks in one hayshed.

The occurrence of the granary weevil, *Sitophilus granarius,* in wheat obtained about 2 years earlier for seed, and in bagged wheat stored for animal feed, on 4 of the farms, was the first record of this pest in the northern part of the State. *S. granarius* had been recorded previously in New South Wales only from southern districts. It was possibly introduced to the Tamworth area in grain transported from southern parts of the State, particularly Parkes, during the 1965–6 drought.

Awareness of publicity

Part of the purpose of the survey was to determine what effect the publicity campaign, organized by the Australian Wheat Board, was having on the cleanliness of farm machinery and storages.

Farmers interviewed were generally aware of the need for farm hygiene to combat insect pests of stored grain. Farmers' wives, however, were often more conscious of publicity, and their encouragement seemed likely to ensure that equipment on most farms would be cleaned before use.

A tendency to leave the cleaning of machinery until just before harvest was obvious from the lack of preparation observed on a number of farms during the survey. Over-dependence on the use of insecticide caused 3 of the farmers to neglect the removal of grain residues from their headers with the result that insect infestation persisted despite the treatment. In two headers, maldison dust had been thrown into the front auger while the machine was running, but insects still persisted. It is evident that this method of application is inadequate to combat infestation throughout the machines.

How can infestation be controlled?

Thorough cleaning of grain-harvesting and handling equipment as soon as harvesting is finished is essential for control of

grain insects on the farm. After all grain residues have been removed and burnt to prevent insect emergence, a residual insecticide spray such as malidson wettable powder should be applied to the inner surfaces of the equipment. Particular attention to all compartments of the header is necessary to control insects which could be sheltering between overlapping metal plates or in parts of the machinery that are hard to reach.

Removal of grain residues from empty silos and grain stores, followed by the application of maldison residual spray to the interior surfaces, is a further important preparation for receiving the grain harvest. At the same time a check should be made of all stocks of grain held in storage on the farm to detect insect infestation which could spread to the newly harvested grain. Insect infestation of bulk or bagged grain can be controlled by fumigation.

Department of Agriculture publications

Insect Pest Bulletin No. 52 "Insect Pests of Stored Grain" details procedure for fumigation of bulk or bagged grain to control stored grain pests.

Entomology Branch Bulletin S 82 "Protecting the Wheat Harvest" describes methods of controlling insect pests of grain in farm machinery and storages and of protecting grain from insect infestation after harvest.

ACKNOWLEDGMENTS

The assistance of Mr G. R. Godden, Regional Supervisor, Northern Region, Mr C. Wilkinson, Field Assistant, and the farmers who co-operated in the survey, is gratefully acknowledged. ●

New Entomological Research

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

Should we rename the Hitler beetle or the Mussolini butterfly? Scientists are shockingly divided.

Some scientists are pushing for species named after offensive people such as Hitler to be renamed, but the official governing body that guides species renaming is opposed. Scientists are calling for animals with offensive names, such as those named after fascist dictators like Adolf Hitler and Benito Mussolini, to be renamed as soon as possible. The demands come after the organization in charge of naming these species ruled out scrapping the controversial names earlier this year to prevent confusion among researchers. All known living and extinct species of animals, plants and microbes have a two-word scientific name, such as *Homo sapiens* for modern humans, which is used by every scientist who refers to that species. The first word (e.g., *Homo*) is the genus name, which is given to all closely related species, and the second word (e.g., *sapiens*) is given to a single species. (Species also have common names, which are easier to change. Some species have multiple common names — for example, orca and killer whale refers to the same species.). The scientists who discover a new species or genus are normally given the responsibility of naming them. In recent times, this has led to a spate of species named after celebrities, such as Taylor Swift, Leonardo DiCaprio and Sir David Attenborough, as well as political figures, such as U.S. presidents. But in the past, this process has led to several species being named after more controversial figures, such as Hitler and Mussolini.

Researcher says feral bees face extinction as deadly mite spreads in swarms

Varroa mite has forced the euthanasia of hundreds of millions of European honeybees by authorities since it was detected at the Port of Newcastle in June last year. While a transition from eradication of the deadly parasitic mite to management will enable beekeepers to treat infested hives, feral bees in Australia are expected to vanish, possibly within three years. Feral bees or wild bees are European honeybees that have their hives in tree trunks and are not the same as the native Australian bee. The varroa mite has little impact on native bees. University of Otago researcher Peter Dearden said feral bees were, effectively, extinct in New Zealand. "Occasionally, you'll find a colony that has just arisen, and then maybe a few that occasionally last over the winter season," Professor Dearden said.

Mealybugs: What They Are and How To Get Rid of Them

If you have plants, mealybugs can pose a serious threat, especially to young plants. There are hundreds of species of mealybugs in North America, and they feed off plants by sucking the juice from them. They can seriously damage and even kill plants. Preventing and eliminating mealybugs will help protect your plants and ensure they flourish. You can spot mealybugs by their white, cottony appearance. They are small, flat, and waxy with oval, segmented bodies. Mealybugs are quite small, usually between 1/20 and 1/5-inch long. Mealybugs prefer warm temperatures and are often found in houseplants or outdoor plants in warm climates.

The astonishing ant diversity of Papua New Guinea

New Guinea is the second-largest island in the world, situated in the ocean just north of Australia. With its almost continental scale, it encompasses a diverse landscape, which includes lush lowland rainforests, but also rugged mountain ranges that span further than the European Alps. Two countries claim its landmass and surrounding islands: the West of Papua belongs to Indonesia, while the East is the independent state of Papua New Guinea (PNG).

New Guinea hosts an impressive biodiversity that has fascinated biological explorers for centuries, and it never quite lost its almost mystical aura of adventure and discovery. Biologists of world fame such as Alfred Wallace, Ernst Mayr and also Edward Wilson ventured here, in awe of the unusual flora and fauna that is an amalgamation of Australian and Asian elements, forming the Melanesian region. The island is also a cradle of human diversity, with over 900 languages and a complex array of cultures that are comparatively preserved to this day. So, of course, visiting New Guinea and studying its incredible ant fauna is an opportunity only a few would pass up.

The Biggest Insect To Ever Creep The Earth Was A Giant Dragonfly-Like Bug

Long before birds ruled the sky, a giant dragonfly-like beast earned the title of being the largest known insect of all time. Known as *Meganeuropsis permiana*, this extinct bug had an estimated wingspan of 71 centimeters (28 inches), around the size of a well-fed pigeon. Remains of *Meganeuropsis permiana* suggested it looked a lot like the dragonflies of today, although they aren't categorized as true dragonflies. Instead, they belong to an extinct order of insects known as *Meganisoptera*, aka griffinflies. They lived during the late Permian era around 275 million years ago when the Earth looked like very different compared to today. All of the planet's major landmasses were collected into a single supercontinent known as Pangaea, formed after Euramerica and Gondwana collided. While the land was

largely dominated by reptiles, insects underwent a dramatic increase in diversification at this time.

Australasia's hidden pollination crisis could threaten biodiversity and food security

Australasia has likely overlooked a pollination crisis, according to new research published today in the journal *Ecology and Evolution.* The research, led by Macquarie University, also underscores a pressing need for intervention to avoid biodiversity loss and long-term food insecurity in the region. The authors analysed thousands of research papers on human-induced pollinator decline globally, and found despite only a tiny portion mentioning Australasia, the causes of pollinator decline in the northern hemisphere were mirrored in this region. Research in Europe and North America finds threats that include loss of natural habitat, climate change, pesticide use, pathogen spread, and introduced species all contribute to population decline in animals (including birds and insects) that act as pollinators and in the plants they pollinate. "At first glance it seems Australasia has dodged a bullet and missed the so-called insect apocalypse and other declines in pollinators," says lead author, Honorary Professor Graham Pyke, from Macquarie University's School of Natural Sciences. But despite little research into pollinator shortages in Australasia, Professor Pyke's team has found serious environmental threats to local pollinators that suggests Australasia's own pollination crisis has gone largely unnoticed.

Fundamentally Altering Previous Thinking – Two Bee Species Have Become One

A recent study conducted by researchers from Curtin and Flinders Universities reveals that what were previously believed to be two distinct species of native Australian bee are, in actuality, one species. Lead researcher Dr. Kit Prendergast from the Curtin School of Molecular and Life Sciences said the study, based on native bee surveys at Perth locations of Wireless Hill, Shenton Park, and Russo Reserve, fundamentally alters previous thinking. "Essentially the research team used DNA sequencing to show that what we used to think of as two different species of bees are actually just the males and females of one, single species," Dr Prendergast said.

Do Adult Periodical Cicadas Actually Eat?

Every so often, cicadas emerge above ground and blanket the earth with their exoskeletons while emitting a high-pitched chirp from sunrise to sunset. The periodical cicadas in the genus *Magicicada* come every 13 or 17 years, though other types of cicadas emerge much more frequently in our neighborhoods. A long-standing agricultural query related to the periodical cicadas was recently answered by an Agricultural Research Service (USDA-ARS) research team at West Virginia's Appalachian Fruit Research Station. Simply: Once periodical cicadas emerge, do they actually feed on vegetation? *Magicicada* pose a threat to U.S. agriculture due to their ability to damage

orchard trees when they lay their eggs on tree branches. Many growers and nurseries take this into consideration and refrain from planting new trees in years when periodical cicadas emerge, as their eggs can kill young trees.

Cigarette beetles and drugstore beetles: *Lasioderma serricorne* and *Stegobium paniceum*

Cigarette beetles (*Lasioderma serricorne*) and drugstore beetles (*Stegobium paniceum*) are notorious pests with an ability to infest a wide range of materials, posing significant threats to stored products and food safety (1). The keys to successful pest management lie in integrating proper identification, understanding their biology and behaviors, and employing a strategic combination of chemical and non-chemical control methods. Adult cigarette beetles are small, measuring about an eighth of an inch in length. They are reddish-brown and have smooth elytra (forewings) and serrate (sawblade-like) antennae (2). The larvae, measuring slightly more than a sixteenth of an inch in length, have a curved, C-shaped body. They appear grayish-white and are sparsely covered with fine brown hairs (3). Adult drugstore beetles are similar in size, measuring between an eighth of an inch in length and a sixteenth of an inch in length. They, too, are reddish-brown, but they have clubbed antennae with three segments elongated and expanded at the tips. They also have rows of pits on their elytra, and a concealed head when viewed from the dorsal (top) perspective. Drugstore beetle larvae are white; about 5/64- to 1/8-inch long; have a C-shaped body; and feature well-developed, segmented legs (4).

The Acid-Spraying Giant Vinegaroons Just Gained Three New Members

If a skunk had a baby with a scorpion, you might just end up with something like a giant vinegaroon. These bizarre arachnids are named after the potent acid they spray that stinks to high heaven of acetic acid, the same thing you get a whiff of from vinegar. Now, three new members have joined the clan following a study that's uncovering the diversity of giant vinegaroon in Mexico. "These recent findings show us that the diversity of this amazing animal may be underestimated, at least in North America," said study author Diego Barrales-Alcalá to IFLScience. "The importance of biological collections can be appreciated [in this study] because one of the species is described from a museum record from a locality in the Mexican state of Chiapas [in 1940]. This locality has undergone many changes over time, mostly related to deforestation, which made it difficult for us to find live specimens of *Mastigoproctus yalchanchak* on recent collecting trips."

Is The Largest Civilization In The World Right Under Our Feet?

They have jobs, societies, and complex relationships with other species – they also live pretty much everywhere on Earth. While insects are perhaps the most overlooked animal group in the world, they are also by far the most numerous.

From butterflies to beetles, they inhabit almost every ecosystem on Earth and there's one group that might have created the largest civilization right under our feet.

The Formicidae family contains roughly 12,000 species of ants. Despite the wealth and variety of species, ants all follow the same basic body plan with each species living in socially complex constructed colonies. These industrious little insects have capabilities as a social group far beyond their tiny individual bodies. To give an idea of just how widespread and capable ants are, researchers suggest that one-third of the animal biomass of the Amazon rainforest is made up entirely of ants and termites.

The Largest Civilization in The World - YouTube

Bedbugs, ticks, and worms: A traveler's guide to pests

While bedbugs have grabbed headlines lately, the tiny bloodsuckers are more icky than dangerous. In fact, "the deadliest animal in the world is the mosquito," says Molly Keck, an entomologist who specializes in pest management at Texas A&M AgriLife. Creepy crawlies—insects, arachnids, worms, and more—are everywhere. Bugs can carry pathogens such as bacteria, nematodes, protozoa, and viruses which transmit tricky-to-diagnose diseases to humans. Many of these illnesses (e.g., dengue fever, Lyme disease) can start with vague symptoms like a headache, fatigue, or fever—and there's not always a telltale bite mark. When travelers get sick, it's understandable to want to get home immediately to familiar medical care, says William Spangler, an emergency medicine doctor and the global medical director with insurance company AIG Travel. "It's likely better to seek treatment locally, where practitioners know the endemic disease and how to treat it."

AN 'INSECT APOCALYPSE' MAY BE UPON US — HERE'S WHAT YOU NEED TO KNOW

You might have heard that insect populations are declining. But at the same time, it seems like mosquitoes are everywhere. While trying to eradicate them with candles, bug zappers, DEET-infused repellants, and chemical fogs, it turns out we've been making the problem worse. An opinion piece by Washington Post columnist Dana Milbank explains that we have worked so hard to rid our homes and yards of mosquitoes and other bugs, (through activities like dousing the grass with chemical sprays and tirelessly raking and bagging fallen

leaves), that we have created an “insect apocalypse” in which only the hardy survive, such as the aggressive, disease-carrying mosquitoes that feed on humans and pets.

Caterpillars evolved their weird chubby little 'prolegs' from ancient crustaceans

The extra legs caterpillars have appear have origins in the primitive crustaceans that insects evolved from during the Ordovician period over 400 million years ago. Scientists have finally figured out where caterpillars got their extra sets of legs from. Turns out, these chubby little limbs originate from their crustacean ancestors over 400 million years ago. Insects have six legs, except when they don't. Caterpillars — the larvae of butterflies and moths — have additional sets of limbs known as prolegs. So do the larvae and even adults of a handful of other insects. These prolegs pose an evolutionary mystery, and scientists have long grappled over how and why they got them. A new study published Oct. 12 in Science Advances suggests these prolegs have origins in the primitive crustaceans that insects evolved from during the Ordovician period (485.4 million to 443.8 million years ago).

The Vast Expansive World of Evolved Ants

PBS Eons looks at the vast and expansive world that ants have created for themselves through evolutionary advances that took place over millions of years. Ants began as a family of flightless wasps, yet as their environment began to include flowering plants and their dietary habits became more herbivore, the number of ant species began to grow. In modern times, the population of ants outweigh that of larger animals.

https://youtu.be/Wp8ux8Xlj48

Fly season: what to know about Australia’s most common flies and how to keep them away

As the days grow longer and temperatures climb, we’re greeted by a familiar chorus of buzzing. It’s fly season again. This year is off to a bumper start, with bush flies swarming beach-goers, March flies on the march, and mosquitoes taking to the skies en masse. But with almost a million species worldwide and some 30,000 calling Australia home, the (unusually) warm weather also presents an opportunity to appreciate these remarkable and essential insects with whom we share our world. Despite their sheer diversity, we’re likely to encounter only a select few flies daily. So who are these curious insects, and how should we think about their presence in our lives?

Scientists combine evolution, physics, and robotics to decode insect flight

Some insects' wings flap without brain input. Robots help us understand how. Different insects flap their wings in different manners. Understanding the variations between these modes of flight may help scientists design better and more efficient flying robots in the future. However, decoding insect flight is not as easy as it sounds. Winged insects have been around for nearly 400 million years, and the evolution of flight in different insect species influences things like how insects flap their wings, what makes some insects highly maneuverable, and how their flight muscles work. A new study has used a mix of evolutionary analysis and robotic model wings to better understand how different flight modes operate.

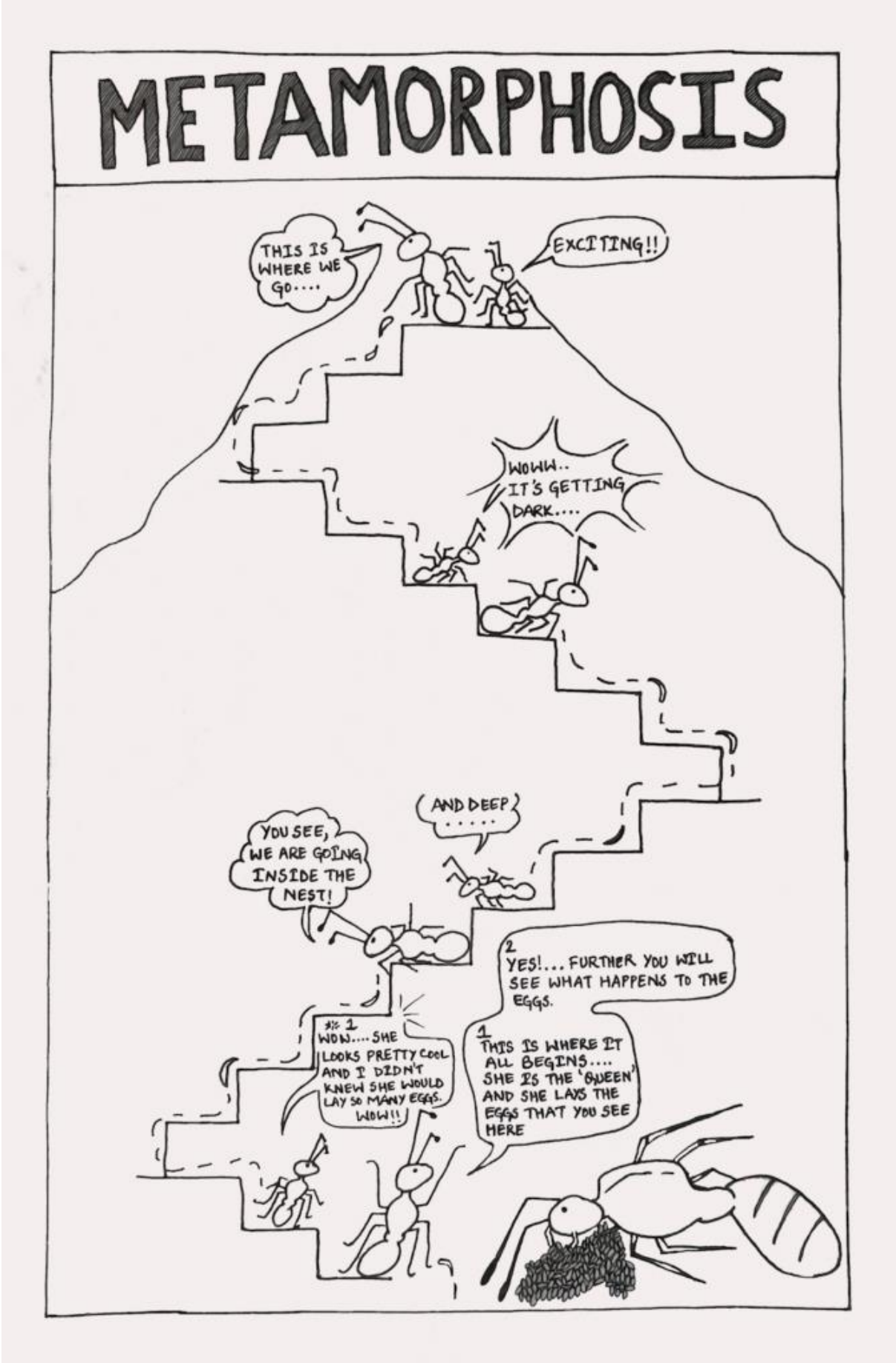
Think This Giant Spider Is About To Eat The Small One? Think Again

When IFLScience visited Wildlife Photographer of the Year 2023, there was one photo that really stopped us in our tracks. On the surface, it looks as if a small arachnid is about to meet its end at the hands (or legs, as it were) of a monstrous spider. However, when it comes to the battle of orb weaver versus dewdrop spider, it's a lot more complicated than that. The wildlife photographer behind the shot is Jerry (Tin Yuen) Tsang whose image "Living Dangerously" was highly commended in the Behaviour: Invertebrate category. Capturing it involved hanging out among the spiderwebs for two hours, Tsang told IFLScience, but the astonishing result tells a fascinating story. "This is a very unique kleptoparasitic relationship between a golden orb weaver (*Nephilia pilipes*) and a dewdrop spider (*Argyrodes sp*). The *Argyrodes* lives by the web of the golden orb weaver rent-free as they themselves don't build webs, snacking on any prey too small to be noticed by the big girl, and in some cases, the *Argyrodes* can even [feed] on the host itself when it moults and becomes defenseless."

Bedbug panic sweeps Paris as infestations soar before 2024 Olympics

A plague of bedbugs has hit Paris and other French cities, provoking a wave of insectophobia and raising questions about health and safety during next year's Olympic Games. That's broadly how the phenomenon has been described in the French - and now international - news media. In part it is true. But in another part it isn't. What is the case is that the number of bedbug sightings has increased over the last weeks - and that that upward trend goes back several years. "Every late summer we see a big increase in bedbugs," says Jean-Michel Berenger, an entomologist at Marseille's main hospital and France's leading expert on *les punaises*. "That is because people have been moving about over July and August, and they bring them back in their luggage. "And each year, the

Let's get to know 'Metamorphosis'



Researchers trial native pollinators as varroa mite threatens European honey bee

Scientists are backing native stingless bees as an effective alternative to European honey bees for pollination of some crops amid varroa mite outbreaks. The European honey bee has been in Australia for about 200 years and, as the main pollinator of crops, is responsible for about a third of the volume of food we eat in Australia. Since varroa mite was discovered at the Port of Newcastle in June last year, more than 25,000 hives have been euthanised in New South Wales, affecting beekeepers and also the fruit and vegetable growers who rely on bees for pollination. With the incursion putting an increased focus on the need for alternative insect pollinators in Australia, researchers from Western Sydney University and Griffith University have been looking into stingless bees. Like their introduced counterpart, these native bees also produce honey, live in large colonies and can pollinate crops.

Early heat and insect strike are stressing urban trees – even as canopy cover drops

Have you noticed street trees looking oddly sad? You're not alone. Normally, spring means fresh green leaves and flowers. But this year, the heat has come early, stressing some trees.

But there's more going on – insects are on the march. Many eucalypts are showing signs of lerp or psyllid attack. These insects hide underneath leaves and build little waxy houses for themselves. But as they feed on the sap, they can give the leaves a stressed, pinkish look. When they appear in numbers – as they are this year – they can defoliate a whole tree with a serious infestation.

How did we get here? Milder, wetter summers during three successive La Niña years mean boomtime for insects. This year, we've had a warm winter and a warm spring, meaning insects are up and about early and in large numbers. This summer will be an El Niño, which usually means drier and hotter weather for most of Australia. For those of us interested in urban trees, these conditions are troubling. But it's more than that. The fact our urban trees are in danger should tell us something – we need to value and protect them better. As the world heats up, our urban forests will be even more at risk.

seasonal increase is bigger than the last one."

Argentine Ants | The Global Super Colony

The Perils of Colony Foundation and Challenges Toward Colony Maturity in Termites

Termites have a complicated life cycle, which departs from most other household pests. Cockroaches for example, have a simple egg-to-adult developmental scheme, where a female lays eggs, which hatch, develop through a series of moults, and later mature into individual fertile adults. In comparison, a termite colony overwhelmingly produces sterile individuals (workers and soldiers) and individuals with a potential for reproduction (winged individuals i.e. alates) are only produced seasonally, once the colony has reached maturity (Figure 1). However, this concept of 'colony maturity' is rarely discussed. I wonder how many of us, during an inspection have said, "Well this is a baby colony that has not matured yet!" Let's be honest: very few of us.

How Far Do Mosquitoes Travel or Fly and Why Does It Matter?

Mosquitoes are annoying but they can also be dangerous. Australia is lucky to be free of major outbreaks of serious mosquito-borne diseases such as dengue and malaria but this doesn't mean that our local mosquitoes don't pose a health risk. Thousands of people fall ill following a mosquito bite each year across the country. Beyond these serious health risks, swarms of summer mosquitoes can still be disruptive to your time outdoors. Some of the fun of spending time in your backyard can be lost when you're swatting away at mosquitoes all afternoon. But where are they all coming from? For most people, it is the Australian backyard mosquito (*Aedes notoscriptus*) that causes most of the problems. This mosquito lives in water-filled containers in our backyards, from bird baths to buckets to blocked gutters and drains. These things fill up with water after rain, eggs hatch and adult mosquitoes can be on the wing and buzzing about in a little over a week.

Let's go drilling! Termites harvest high-grade uranium at Haranga Resources' Saraya project

Extensive, +2km long anomalies identified from termite mound sampling at Haranga Resources' 16Mlb Saraya uranium project in Senegal will be targeted in an imminent drill program. For geologists, termite mounds are an easily accessible way to identify indicators of mineralisation which can come from depths of up to 70m. Fractions of bedrock are pulled up from depth by the termites and can characterise, using soil sampling, the underlying mineralisation. The termite mounds are highly useful for regions where thick regolith or hard-to-access surface cover makes access to the bedrock difficult – and they're littered all over Haranga's Saraya project tenements. Sanela's termites love the yellowcake. Infill sampling at two of the four priority areas, Saraya NNE and Sanela, have been completed to-date. Assays from 2,480 termite mound samples at the Sanela prospect are showing up to

17ppm uranium which suggests a highly prospective uranium anomaly at the prospect and Haranga is keen to get the drill bit out to prove up another resource.

Freshwater creatures recovering despite sewage pollution

Invertebrates such as dragonflies, snails, mayflies, shrimp and worms are recovering in England's rivers despite the pollution, a study has found. These species are in a much better state than they were before 1990, with the trend holding across much of Europe as well, the researchers said. A recent State of Nature report found that overall, British nature is in decline with about one in six species at risk of becoming extinct from Britain. While many land-based creatures are suffering, freshwater species are not, said the UK Centre for Ecology & Hydrology (UKCEH), who led the study.

Aussies lose it over explosion of 'annoying' pest during warm weather

The great Aussie salute has well and truly arrived early this year. Social media is abuzz with videos showing people swatting away flies after the pest appeared in big numbers ahead of schedule. In one viral post a man can be seen at Maroubra Beach with his back absolutely covered, prompting thousands of comments from other fed-up fly victims in Sydney. So what's with their premature arrival, and is there really a link between personal hygiene and how a fly chooses who to bug? Entomologist and Associate Professor at the University of Sydney, Tanya Latty, told Yahoo News Australia it's normal to see a spike in flies in warmer weather, which we have started to experience early due to El Niño and a positive Indian Ocean Dipole. "They're waking up earlier and coming out earlier than normal," she explained.

How These 5 Tiny Caterpillars Protect Themselves With Deadly Venom

Caterpillars have evolved over millions of years to defend themselves against predators. Over those years of evolution, the insect larvae have split into different geneses that sport vibrant colors, mesmerizing shapes and sharp thorns of distinctive tints and sizes. While some caterpillars don't show spikes at all, they advertise their toxicity with their stripes and shades. A prime example is the Monarch caterpillar, which sports stripes interchanging between yellow, white, and black. "They're advertising that they're Clint Eastwood. That they're badasses, and they know it. Obviously, they want to be seen and they want you to know that they're there because they're chemically protected," says David Wagner, an entomologist at the University of Connecticut.

Australian scientists discover rare spider fossil that could be up to 16 million years old

Scientists in Australia have discovered the fossilized remains of a trapdoor spider, the largest to date in the country. The fossilized spider was found near Gulgong, New South Wales, last week by a team of scientists led by Matthew McCurry, a paleontologist with the University of New South Wales and the Australian Museum Research Institute. "Only four spider fossils have ever been found throughout the whole continent, which has made it difficult for scientists to understand their evolutionary history," McCurry said in a news release. "That is why this discovery is so significant, it reveals new information about the extinction of spiders and fills a gap in our understanding of the past."

Study shows invertebrate decline reduces natural pest control and decomposition of organic matter

The decline in invertebrates also affects the functioning of ecosystems, including two critical ecosystem services: aboveground pest control and belowground decomposition of organic material, according to a new study published in *Current Biology* and led by researchers at the German Centre for Integrative Biodiversity Research (iDiv) and Leipzig University. The study provides evidence that loss of invertebrates leads to a reduction in important ecosystem services and to the decoupling of ecosystem processes, making immediate protection measures necessary. nvertebrates, such as insects and also other arthropods, snails, slugs and nematodes, represent ~75% of all species described on Earth and are a fundamental part of ecosystems, providing many critical ecosystem functions and services, such as pollination, decomposition, and natural pest control.

The World's Largest—and Stinkiest—Flower Is in Danger of Extinction

Parasitic, elusive, and emitting an overwhelming odor of putrefying flesh, *Rafflesia*—often called the corpse flower—has intrigued botanists for centuries. Now, scientists are warning that it is at risk of extinction and calling for action to save it. The blooms of the *Rafflesia* have become famous for their odor of decaying meat, produced to attract flesh-eating flies. But the genus—which includes the largest flowers in the world, at more than a meter across—is at risk due to the destruction of forest habitats in Southeast Asia. There are 42 species of Rafflesia, and researchers warn that all of them are under threat, with 25 classified as critically endangered and 15 as endangered. More than two-thirds are not being protected by current conservation strategies, according to a new study published in the journal *Plants, People, Planet*. It is the first global assessment of the threats facing these plants. Chris Thorogood, from the University of Oxford Botanic

Garden, an author of the study, said the study “highlights how the global conservation efforts geared toward plants—however iconic—have lagged behind those of animals.”

Map shows Australia infiltrated by $70 billion threat

After a year of “tireless” eradication efforts, Australia will cease attempts to eradicate a deadly bee parasite which could cost the honey industry $70 million a year if an outbreak where to occur. The National Management Group (NMG) made the decision to shift efforts to managing the spread of varroa mite this week after the government’s $132 million response saw 30,000 hives euthanased in a bid to wipe out the mite. Australia had been the last continent to remain free of varroa mite, which can weaken bees or cause death from viral infection, until they were detected in sentinel hives at the Port of Newcastle in NSW last year. “The transition from an ‘eradication’ program to a ‘management’ program was concluded because of the many factors working against a possible eradication in Australia,” the NSW government said in a statement this week.

New Research Reveals That Insect Protein Can Slow Weight Gain and Boosts Health

With the world’s population on the rise and climate change intensifying, there’s an increasing need for sustainable protein alternatives. While plant-based “meat” and “dairy” have gained popularity, they’re not the sole green alternatives to traditional meat.
Research from the University of Illinois Urbana-Champaign, conducted on mice, indicates that substituting conventional protein sources with mealworms in high-fat diets could slow weight gain, improve immune response, reduce inflammation, enhance energy metabolism, and beneficially alter the ratio of good to bad cholesterol. “In addition to more dietary fiber, nutritionists also recommend eating more high-quality proteins as part of a weight management plan. We knew from an earlier study in roosters that mealworms are a high quality, highly digestible protein source that’s also environmentally sustainable,”

Blitz squashes crazy ants at Qld sites but war rolls on

A concerted blitz has eradicated acid-spitting yellow crazy ants from two large sites in Queensland but the war against the invader is far from won. The yellow crazy ant is among the world's worst invasive species and has taken hold in the Wet Tropics between Townsville and Cooktown. It poses a major threat to biodiversity in the World Heritage area. Named for their erratic, "crazy" movements when disturbed, the ants can form huge super-colonies containing thousands of queens, and worker ant densities can reach up to 20 million per hectare. They kill native animals by squirting formic acid into their eyes, blinding them and

leaving them to starve to death. The ants also feed on sucking insects which disrupts ecosystem health, and their presence can make residential yards unusable.
An eradication program funded by the federal and state governments is working to keep them out of the most sensitive areas.

It's warming up and mozzies are coming. Here's how to mosquito-proof your backyard

The weather is warming up and that means more time in the backyard. It also means more mosquitoes. Here are five ways you can mosquito-proof your backyard that don't rely on spraying insecticides.

1. Get rid of water
2. Screen up – windows, doors and rainwater tanks
3. Choose your garden plants carefully
4. Encourage the animals that eat mosquitoes
5. Avoid traps and other gadgets

Yes, you'll still need repellent

Web of Contamination: Shoreline Spiders Transfer Mercury up the Food Chain

Researchers have highlighted the role of certain shoreline spiders, particularly long-jawed spiders, in moving mercury contamination from aquatic regions to terrestrial ecosystems. Mercury, which largely comes from industrial pollution, can enter water systems and be converted into a toxic form, methylmercury. This methylmercury then travels up the aquatic food chain and is consumed by spiders, which are, in turn, eaten by land animals. Sitting calmly in their webs, many spiders patiently await for prey to come to them. Arachnids along lakes and rivers eat aquatic insects, such as dragonflies. When these insects live in mercury-contaminated waterways, they can pass the metal along to the spiders that feed on them. Now, researchers reporting in ACS' *Environmental Science & Technology Letters* have demonstrated how some shoreline spiders can move mercury contamination from riverbeds up the food chain to land animals.

New species of burrowing spider unearthed in outback WA

Jeremy Wilson is stabbing the red dirt with his pocketknife. Every flick of the wrist brings him closer to his next find. But, unlike the prospectors trying their luck in Western Australia's northern Goldfields, Dr Wilson is not hoping to unearth a gold nugget. He is looking for something that has eight legs, two fangs, silk-excreting glands, and still no name.
As a child, Dr Wilson, or "spider-man" as he is often called, had an irrational fear of arachnids, until he was bitten by curiosity. "I have always been a little bit afraid of them, and that made me more interested," he says. Dr Wilson likes to share his scientific discoveries on social media. Years of study have seen him become one of Australia's most respected spider experts. It's also left him with a certainty spiders are misunderstood predators, who have little interest in hurting humans.

Springtails: The Ancient Masters of Antifreeze and Arctic Survival

More than 400 million years ago, an insect-like animal called the springtail developed a small protein that prevents its cells from freezing. The globe was hot and humid. The sea was teeming with life. Early squids, eel-like fish, and sea worms hunted smaller animals. Above ground, however, nothing stirred. The animals had not yet crawled ashore. That was what the Earth looked like about 450 million years ago at the end of the Ordovician period. The warm water created the perfect living conditions for wildlife. But this would soon change. Shortly after, the land masses would begin to freeze and an ice cap would start to spread. The water, which had previously been warm and accommodating to wildlife, became cold and inhospitable. One species after another succumbed. In a short period of time, half of all life had been wiped out as part of the second-worst mass extinction in the history of the planet.

Mystery of 'living fossil' tree frozen in time for 66 million years finally solved

The Wollemi pine was thought to have gone extinct 2 million years ago until it was rediscovered by a group of hikers in 1994. Now, scientists have decoded its genome to understand how it's survived — almost unchanged — since the time of the dinosaurs. In 1994, hikers discovered a group of strange trees growing in a canyon in Wollemi National Park, about 60 miles (100 kilometers) west of Sydney, Australia. One hiker notified a park service naturalist, who then showed leaf specimens to a botanist. It was ultimately determined they represented an ancient species that had been essentially frozen in time since dinosaurs roamed Earth. Called a "living fossil" by some, the Wollemi pine (*Wollemia nobilis*) is nearly identical to preserved remains dating to the Cretaceous period (145 million to 66 million years ago). There are now just 60 of these trees in the wild — and these tenacious survivors are threatened by bushfires in the region. It was thought to have gone extinct around 2 million years ago. Now, scientists from Australia, the United States and Italy have decoded its genome, shedding light on its unique evolution and reproductive habits, as well as aiding conservation efforts. The paper was posted to the preprint database bioRxiv on Aug. 24 and has not been peer reviewed.

Hundreds of trees cut down as 'significant' outbreak poses huge risk to Australia

Australia's $24 billion commercial forestry industry is under threat following the discovery of an exotic pest in Adelaide that has seen a park closed and 300 trees destroyed. The City of Tea Tree Gully in South Australia has notified the public of a serious outbreak of giant pine scale that has forced the Department of Primary Industries and Regions (PIRSA) to destroy hundreds of trees in Highbury and Hope Valley. Locals have been told that certain areas, including the popular

Elliston Reserve, will be closed until 2024 while experts attempt to eradicate the pest from South Australia. Those who attempt to go in and remove vegetation from the restricted area face a maximum $5000 fine under the Plant Health Act. "The impact of the giant pine scale insect on our community is significant," General Manager, City of Tree Gully Operations, Felicity Birch has said in a recent statement. "We understand that it's confronting for locals to see these established trees be removed so quickly, but it was a necessary measure to protect further losses elsewhere." Australia has about two million hectares of sustainable, commercial plantation forestry, and Australia's forest industries contribute around $24 billion to the economy every year.

Not Science Fiction – The Peculiar Sex Lives of Orchids

A recent study published in the *Botanical Journal of the Linnean Society* utilized a database to highlight the astonishing diversity of specialized pollination tactics orchids possess, which vary across the world. The recently published database contains over 2900 orchid species, detailing information on the identity of their pollinators and how they attract them. Importantly, "From these data, we identify general patterns and knowledge gaps limiting our understanding of orchid biology at the global level," Dr Phillips said. Charles Darwin used orchids to study evolution, believing their elaborate flower was an adaptation to enhance the probability of transferring pollen between plants – thereby increasing their offspring's fitness. "Because of the unusual floral traits and often unconventional pollination attraction strategies, orchids have been at the forefront of understanding floral adaptations to pollinators," Dr Phillips said. Indeed, Darwin famously predicted that the Madagascan orchid *Angraecum sesquipedale* – with its 40 cm long nectar spur – would be pollinated by a moth with an equally long and outlandish proboscis.

The "Venom" Spider: New Genus Named After Popular Marvel Character

Tom Hardy and his iconic Marvel role, Venom, have inspired the naming of a newly discovered Australian spider. The genus *Venomius* and its only current species *Venomius tomhardyi* were described following an expedition to Tasmania. Scientists MSc Giullia Rossi, Dr Pedro Castanheira, and Dr Volker Framenau from Murdoch University (Perth, Australia) partnered with Dr Renner Baptista from the Federal University of Rio de Janeiro (Brazil) to describe the new genus of orb-weaving spiders published in the open access journal *Evolutionary Systematics*. Tom Hardy portrays Eddie Brock and his alter-ego Venom, an antihero closely associated with Spider-Man, across two Marvel films and gives his name to the sole species of the new genus. The distinctive black spots on the spider's abdomen reminded the scientists of Venom's head, inspiring them to select the unusual name. The genus belongs to the Araneidae family of spiders that build upright circular webs to capture prey. Despite resembling the related genus *Phonognatha* as both do not have tubercles on the abdomen, the newly described spiders are distinct in their behavior of creating silk-lined holes in the branches of trees for shelter, as well as their different genitalia.

Many people hate wasps, but they're smarter than you might think – and ecologically important

Everybody loves bees, but their cousins the wasps often provoke a far less friendly reaction. The much-maligned insects often inspire fear, disgust or even the "kill it with fire" response.
The stereotypical wasp is the angular, angry-looking vespid with black and yellow stripes known as the European wasp (*Vespula vulgaris*). It has a reputation for aggression, stinging multiple times and contributing little to society. But that's just one of more than 100,000 known wasp species with a wide range of appearances, many of which don't even sting.
In our work with wasps, we have found these innocent insects have done little to deserve our scorn. In fact, they have surprisingly complex minds and can play important ecological roles. Our latest study, published in Behavioral Ecology and Sociobiology, shows European wasps have impressive abilities to learn visual tasks in different ways depending on how we train them. It adds to a growing body of research about what wasp's minds can do – including recognising human faces and learning other complex tasks.

The true damage of invasive alien species was just revealed in a landmark report. Here's how we must act

Invasive alien species are driving biodiversity loss and extinctions in every country, all over the world. Responding to the challenge, the United Nations is today releasing the first global assessment of invasive alien species and their control. It comes from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which represents almost 140 member states. Over four years, 86 expert authors from 49 countries gathered the latest scientific evidence and Indigenous and local knowledge on invasive alien species. The report draws on more than 13,000 references, including governmental reports. We were among the authors. Here are some of the key insights for Australia and Aotearoa New Zealand.

Australia's least wanted – 8 alien species and diseases we must keep out of our island home

This week's landmark report on the impact of invasive alien species revealed costs to the global economy exceeded US$423 billion (A$654 billion) a year in 2019. Costs have at least quadrupled every decade since 1970 and that trend is set to continue. Prevention is better than a cure. Stopping pests and diseases arriving and establishing in Australia is not only better for the environment, it's much cheaper too. The biosecurity system is our front line against invasion. Species that pose a significant risk to agriculture have historically received more attention, but we also need to defend our borders against threats to nature. Here we take a closer look at some pests and diseases we need to keep out at all costs, to protect our biodiversity.

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